

# ROAD SAFETY AUDIT

Route 134 High Crash Locations

Town of Dennis

December 15, 2020

Prepared For:  
MassDOT



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CAPE COD  
COMMISSION

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## Background

The Federal Highway Administration (FHWA) defines a Road Safety Audit (RSA) as the formal safety examination of an existing or future road or intersection by an independent, multidisciplinary team. The purpose of a Road Safety Audit is to identify potential safety issues and possible opportunities for safety improvements while considering all roadway users. Potential safety improvements can range from short-term to long-term improvements and should reference the 4 E's; including Engineering, Education, Emergency Response and Enforcement. This RSA evaluates the following three high crash intersections on Route 134 in Dennis, MA as shown in Figure 1:

- Route 134 at Patriots Square/Market Place
- Route 134 at Theophilus F. Smith Road
- Route 134 at Bob Crowell Road

The Cape Cod Commission (CCC), serving as the regional planning agency for the fifteen towns on Cape Cod, has reviewed many transportation locations over the years during various processes, including the Regional Transportation Plan, the Transportation Improvement Program, and Developments of Regional Impact, considering the existing safety issues and potential improvements. In 2019, CCC Staff developed a Top Crash Locations report and the Cape Cod Crash Dashboard, which serve as a resource to make Cape Cod safer for motorists, pedestrians, and bicyclists. CCC staff reference the Top Crash Locations report and dashboard to prioritize locations for future Road Safety Audits. The Top Crash Locations report also serves as a resource for transportation safety professionals looking to make strategic investments to improve safety in the region. High crash locations are also identified through the MassDOT Highway Safety Improvement Program (HSIP).

Based on our 2019 Top Crash Locations report, the intersection of Route 134 (East-West Dennis Road) at Patriots Square/Market Place was ranked #1 while also being identified as a MassDOT HSIP crash cluster in 2014-2016. The intersection of Route 134 at Bob Crowell Road was also identified as a MassDOT HSIP cluster in 2014-2016. It should be noted that these two intersections are not currently identified as MassDOT HSIP crash clusters based on the latest crash data from 2015-2017. The Theophilus F. Smith Road was not identified as a MassDOT crash cluster but was identified as a MassDOT HSIP crash cluster in 2013-2015. Additionally, the intersection of Route 134 at Theophilus F. Smith Road ranked #8 in our 2019 Top Crash Locations report.

## Project Data

The RSA was held on Tuesday, December 15, 2020 with representatives from state, regional and local agencies and organizations providing expertise in the engineering, planning, maintenance, and emergency response fields. Due to the COVID-19 pandemic, the RSA was held virtually in accordance with MassDOT policy. Attendees were encouraged to visit the site prior to the audit and to review the collision diagrams and crash summaries to become familiar with the existing safety issues. Videos of the

locations were also provided in advance to attendees. A list of the attendees is provided in Table 1 with their contact information provided in Appendix B. A copy of the RSA Agenda can be found in Appendix A.

**Table 1: Participating Audit Team Members**

<b>Audit Team Member</b>	<b>Agency/Affiliation</b>
Tom Andrade	Town of Dennis – Town Engineer
David Johansen	Town of Dennis – DPW Director
Greg Rounseville	Town of Dennis – Assistant Town Administrator
Cleve Daniels	Town of Dennis – Deputy Chief of Police
Dan Fortier	Town of Dennis – Town Planner
Jill McLaughlin	Stantec
Joseph Rodricks	Stantec
Bianca Marshall	MassDOT District 5 Traffic
Jason Walters	MassDOT District 5 Projects
Ana Fill	MassDOT Traffic & Safety Engineering
Kevin Fitzgerald	MassDOT Traffic & Safety Engineering
Ale Kuncaitis	MassDOT District 5 Highway
Jason Dvelis	FHWA
Sean Polay	Cape Cod Joint Transportation Committee Bicycle Representative
Noah Berger	Cape Cod Regional Transit Authority
Colleen Medeiros	Cape Cod Commission
Steven Tupper	Cape Cod Commission
David Nolan	Cape Cod Commission
Lev Malakhoff	Cape Cod Commission

The RSA was held remotely due to the ongoing Covid-19 pandemic. As a group, the team identified safety issues at the intersections. A virtual field visit to the study intersection using pre-recorded videos followed. The audit team finished the meeting by determining appropriate short, medium, and long-term countermeasures for the safety issues discussed. This RSA has been conducted in context with other planning efforts. The Town of Dennis is currently developing a Route 134 Corridor Master Plan for this section of roadway in consultation with Stantec. The Town also is looking to repave portions of Route 134 and Market Place in the near future.

## Project Location and Description

### *Study Area Roadways*

#### Route 134

Route 134 is classified as an urban principal arterial running in the north-south direction between Route 6A to the north and Route 28 to the south. Route 134 provides access to the Mid-Cape Highway (Route 6)

via a four-leaf clover interchange. Route 134 is generally under Town of Dennis jurisdiction, however, there is a small portion of Route 134 between Bob Crowell Road and Patriots Square that is under MassDOT jurisdiction. Within the RSA limits, Route 134 generally has a posted speed limit of 40 miles per hour (mph) and consists of commercial and retail land uses. The cross section along Route 134 varies, with the roadway generally consisting a one 11.5-foot travel lane in each direction north of the Route 6 interchange and two 12-foot travel lanes in each direction south of the Route 6 interchange. A two-way left-turn lane measuring 15-feet wide exists on Route 134 south of Theophilus F. Smith Road for approximately 900 feet. Turn lanes also exist at the signalized intersections noted below. A five-foot wide sidewalk exists on the eastern side of Route 134 starting at the Patriots Square intersection and continues south towards Route 28. Additionally, there is an eight-foot-wide shared use path located on the westerly side of Route 134 north of Bob Crowell Road. No other bike facilities are provided. The Cape Cod Regional Transit Authority (CCRTA) provides bus service along Route 134 south of the Route 6 interchange via the H2O line with a transit stop within Patriots Square. CCRTA also operates regular express service from Patriot Square to and from the Hyannis Transportation Center via Route 6 under the “Patriot LTD” brand. The Patriot LTD converts what had previously been deadhead runs to and from the garage into revenue service open to the riding public.

#### Market Place

Market Place is a small ring road that connects between Main Street and Route 134. Market Place is classified as a local two-lane roadway under town jurisdiction and primarily provides access to retail uses and has numerous curb cuts along the roadway. There is a short five-foot sidewalk that extends along the Cape Cod Five (CC5) Bank property between Main Street and the CC5 driveway. No bike facilities are present.

#### Theophilus F. Smith Road

Theophilus F. Smith Road is a two-lane roadway that begins at Route 134 to the west and extends easterly for just over a half mile and terminates at South Gage’s Way. Theophilus F. Smith Road is classified as an urban collector under Town of Dennis jurisdiction and provides access to various retail and industrial uses, including the Town of Dennis Transfer Station and Department of Public Works. Additionally, Theophilus F. Smith Road provides access to the CCRTA Operations and Maintenance Facility where all their buses are stored overnight. Some inbound CCRTA Patriot LTD buses stop on Theophilus F. Smith Road adjacent to the Cinema. No bike facilities are present.

There is a short section of sidewalk located on Theophilus F. Smith Road between Route 134 and Enterprise Road.

#### Bob Crowell Road and Hemlock Lane

Bob Crowell Road is a two-lane urban minor arterial roadway under Town of Dennis jurisdiction. Bob Crowell Road extends for approximately 2,000 feet between Old Bass River Road to the west and Route 134 to the east and provides access to recreation fields, Town Hall, Dennis Police Station and two small residential neighborhoods. There is a six-foot wide asphalt sidewalk provided along the northern side of Bob Crowell Road.

Hemlock Lane is a two-lane local residential roadway under Town of Dennis jurisdiction. Hemlock Lane provides access to a large residential neighborhood. There are no sidewalks currently provided on Hemlock Lane. No bike facilities are present.

### ***Study Area Intersections***

The following intersections were analyzed as part of this RSA.

#### Route 134 at Patriots Square/Market Place

The Route 134 at Patriots Square and Market Place is a four-way signalized intersection. In the southbound direction, Route 134 consists of a ten-foot exclusive left-turn lane, an eleven-foot through lane and an 11.5-foot shared through-right turn lane and is separated from northbound traffic by a four-foot concrete median. The Route 134 northbound approach consists of a twelve-foot exclusive left-turn lane, an eleven-foot through lane and an eleven-foot shared through-right turn lane separated by a double-yellow centerline. The northbound left-turn lane has a storage length of approximately 230 feet while the southbound left-turn lane has a storage length of approximately 260 feet. The eastbound Market Place approach consists of an eleven-foot exclusive left-turn lane and a ten-foot through lane separated by a landscaped median and also includes a 17-foot-wide channelized right turn lane. Conversely, the westbound approach from Patriots Square also consists of a twelve-foot exclusive left-turn lane and an eleven-foot through lane separated by a landscaped median and also includes a 21-foot-wide channelized right-turn lane. Both channelized right-turn lanes are signed to operate under yield control.

There is an approximate five-foot asphalt sidewalk located on the southeasterly side of Route 134 with a signalized crosswalk located along the southerly approach on Route 134. On the westerly side of Route 134 there is a receiving curb ramp for the crosswalk. There are no bicycle accommodations provided on any approach.

#### Route 134 at Theophilus F. Smith Road

Theophilus F. Smith Road intersects Route 134 as a T-signalized intersection. Theophilus F. Smith Road experiences heavy truck volumes as it provides access to various commercial and industrial uses. At the signalized intersection, Theophilus F. Smith Road consists of an eleven-foot wide exclusive left-turn lane and an eleven-foot wide right turn lane. In the northbound direction on Route 134, the cross section consists of an eleven-foot wide through lane and an eleven-foot wide shared through-right turn lane separated by a scored concrete median measuring 15 feet wide. The scored concrete median transitions to a two-way left-turn lane (TWLTL) south of Theophilus F. Smith Road for approximately 900 feet. On Route 134 southbound, there is a 13-foot wide exclusive left turn lane with a storage length of approximately 340 feet and two eleven-foot through lanes.

There is an approximate five-foot asphalt sidewalk located on the easterly side of Route 134 with a signalized crosswalk located along the easterly approach on Theophilus F. Smith Road. A small section of sidewalk is also provided on the northerly side of Theophilus F. Smith Road between Route 134 and Enterprise Road. There are no bicycle accommodations provided on any approach.

### Route 134 at Bob Crowell Road/Hemlock Lane

The Route 134 at Bob Crowell Road and Hemlock Lane is a four-way signalized intersection. In the southbound direction, Route 134 consists of a twelve-foot exclusive left-turn lane, an eleven-foot through lane and an eleven-foot right-turn only lane separated by a double-yellow centerline. In the northbound direction, Route 134 consists of an eleven-foot exclusive left-turn lane and a twelve-foot shared through right-turn lane separated by a double yellow centerline. The northbound left-turn lane has a storage length of approximately 150 feet while the southbound left-turn lane has a storage length of approximately 100 feet. The eastbound Bob Crowell Road approach consists of an 18-foot shared left-turn/through lane and an approximately 22-foot-wide channelized right turn lane separated by a median. The westbound Hemlock Lane approach consists of a one shared eleven-foot travel lane.

North of the intersection, there is an eight-foot-wide shared use path along the northwesterly side of Route 134 which transitions to a six-foot wide sidewalk along Bob Crowell Road, however, there are no crosswalks or pedestrian accommodations located within the signalized intersection nor are there any bicycle accommodations on any of the roadways.

### ***Crash Data***

Crash reports were supplied by the Dennis Police Department and supplemented with crash reports provided by MassDOT. The crash reports were reviewed, and a collision diagram was developed for each of the three study area intersections. The crash diagrams are provided in Appendix C.

### Route 134 at Patriots Square/Market Place

The intersection of Route 134 at Patriots Square/Market Place experienced an average of thirteen (12.6) crashes per year over the five-year (2013-2017) study period, a total of 68 crashes. Approximately 51 percent of the crashes were rear-end crashes, 26 percent were angle crashes, 18 percent were sideswipe crashes, and four percent were single vehicle crashes (including pedestrian and bicycle crashes). There were no fatal injuries at this intersection, however, 18 percent of the crashes resulted in an injury. Approximately 13 percent of the crashes occurred in the month of June, and 12 percent of the crashes occurred during each of the months of March, May, August, and September indicating a higher incidence during the summer months. There were two crashes that involved a bicyclist and one crash that involved a pedestrian. Approximately 45% of the crashes occurred between 2 and 6 pm. About 22% of the crashes were outside of daylight hours and 16% occurred during wet or snowy conditions. Based on the Cape Cod Commission 2019 Top Crash Locations report, the intersection of Route 134 at Patriots Square/Market Place is ranked #1 of the top 50 crash locations on Cape Cod while also being identified as a MassDOT Highway Safety Improvement Program (HSIP) crash cluster in 2014-2016.

### Route 134 at Theophilus F. Smith Road

The intersection of Route 134 at Theophilus F. Smith Road experienced an average of ten (9.8) crashes per year over the five-year (2013-2017) study period, a total of 49 crashes. Approximately 47 percent of the crashes were rear-end crashes, 41 percent were angle crashes, 10 percent were sideswipe crashes,

and two percent were single vehicle crashes (including pedestrian and bicycle crashes). There were no fatal injuries at this intersection, however, 16 percent of the crashes resulted in an injury. Approximately 24 percent of the crashes occurred in the month of July, and 20 percent of the crashes occurred during August, indicating a higher incidence during the summer months. There were three crashes that involved a bicyclist and no crashes that involved a pedestrian. Approximately 68% of the crashes occurred between 10 am and 6 pm. About 18% of the crashes occurred outside of daylight hours and 12% occurred during wet or snowy conditions. Based on the Cape Cod Commission 2019 Top Crash Locations report, the intersection of Route 134 at Patriots Square/Market Place is ranked #8 of the top 50 crash locations on Cape Cod but did not appear as a MassDOT HSIP crash cluster. It was however identified as a crash cluster in MassDOT's 2013-2015 analysis.

#### Route 134 at Bob Crowell Road/Hemlock Lane

The intersection of Route 134 at Bob Crowell Road/Hemlock Lane experienced an average of eight (7.6) crashes per year over the five-year (2013-2017) study period, a total of 38 crashes. Approximately 79 percent of the crashes were rear-end crashes, 13 percent were angle crashes, three percent were sideswipe crashes, and five percent were single vehicle crashes. There were no fatal injuries at this intersection, however, 26 percent of the crashes resulted in an injury. Approximately 18 percent of the crashes occurred in the month of July, and 16 percent of the crashes occurred during August indicating a higher incidence during the summer months. There were no crashes that involved a bicyclist or a pedestrian. Approximately 37 percent of the crashes occurred between 12 and 2 pm. About 14% of the crashes occurred outside of daylight hours and 26% during wet roads. The intersection of Route 134 at Bob Crowell Road/Hemlock Lane was identified as a MassDOT HSIP cluster in 2014-2016. It is not listed as one of the top 50 crash locations on Cape Cod.



Figure 1: Locus Map

## Audit Observations and Potential Safety Enhancements

The Road Safety Audit Team met virtually to discuss existing conditions, safety issues and potential countermeasures. Data that was reviewed included a crash summary, collision diagram, RSA prompt list and a series of bar graphs depicting safety trends found at each intersection, all of which are included in Appendix D. The virtual RSA also included a review of video drone footage for each study area intersection as well as a collection of dashboard camera videos of the corridor and the operations of the intersections.

The following safety issues and potential enhancements were identified through the discussions with the Road Safety Audit team. Several of the issues require further study and engineering to determine the feasibility of implementing enhancements.

### Route 134 Corridor-Wide Issues

#### Safety Issue #1: Corridor Operations

##### **Observations:**

The Route 134 corridor is a busy and congested corridor as it provides access to commercial areas and is the main access point to the Route 6 interchange in the town. The corridor often experiences regular congestion and queuing, which is exacerbated during the summer peak periods. Like most traffic signals on Cape Cod, the three traffic signals included in this RSA do not have separate signal timing plans during the summer peak period versus the off season, which leads to traffic congestion and queuing. The signalized intersections of Route 134 at Patriots Square/Market Place and Route 134 and

Theophilus F. Smith Road are located in close proximity at approximately 700 feet apart and used to operate as a coordinated signal system previously. Due to a storm event in 2016, the transformer at the Theophilus F. Smith intersection blew and a primary wire came in contact with the traffic lights and poles. Since that event, the signal coordination between these two intersections has not worked.

Based on the existing congestion along the corridor and the high occurrence of rear end crashes (51 percent), unsafe driver behavior, such as aggressive and distracted driving, is a likely contributing factor. Drivers waiting at red lights become impatient and distracted by looking at their mobile phones which can lead to rear end crashes.

Based on the large percentage of red light-running angle crashes and the high presence of rear-end collisions, there appears to be inadequate timing during the clearance intervals at several of the signalized



**Image 1: Route 134 Congestion**

intersections, which was also confirmed by CCC Staff during a site visit. It is also unclear if the pedestrian signal intervals meet the latest standards.

**Enhancements:**

- Upgrade signal coordination on Route 134 between the Patriots Square and Theophilus F. Smith Road traffic signals.
- Upgrade all traffic signals along the Route 134 corridor to adaptive traffic signals to reduce congestion, most notably during the summer peak periods.
- Review the need to add additional capacity at signalized intersections and along the corridor in the future as part of the Route 134 Corridor Master Plan.
- Review and update vehicular and pedestrian clearance intervals at all three traffic signals.
- Update signal timing for summer months.
- Increase enforcement of red light running.

**Enhancements:**

Safety Issue #2: Emergency Response

**Observations:**

The Town of Dennis Police and Fire Departments are currently equipped with emergency pre-emption transponders within their vehicles; however, emergency pre-emption is not currently provided at any of the three RSA signalized intersections. The Route 134 and Upper County Road traffic signal, located south of Theophilus F. Smith Road, currently has emergency pre-emption installed. Due to the congestion experienced along the corridor and at the signalized intersections, emergency pre-emption at the three RSA signalized intersections would aid by reducing emergency response times. The same technology could also be used to give signal-priority to CCRTA vehicles in order to ease congestion for transit riders. A structural analysis of the existing traffic signal mast arms may be required to assess if the additional equipment can be added.



**Image 2: Police Vehicle Maneuvering Through Intersection**

### Enhancements:

- Install emergency pre-emption for emergency response vehicles at all three RSA signalized intersections, as well as signal-priority treatments for CCRTA buses. (Note: a structural analysis may be required)

### Safety Issue #3: Multi-Modal Accommodations

#### Observations:

RSA participants noted that multi-modal accommodations throughout the corridor are inconsistent and missing. Route 134 is one of the only two crossings of Route 6 in the town of Dennis and neither of the roads crossing Route 6 have pedestrian or bike accommodations. A site visit performed by CCC Staff, noted pedestrian and bicycle activity is present along the corridor and at the three RSA intersections. Additionally, with the presence of the Cape Cod Rail Trail south of Theophilus F. Smith Road, there is an opportunity to further enhance multi-modal accommodations to connect to the off-road facility.

Currently, there are three portions of sidewalk along the corridor that are not connected. The lack of connectivity may result in pedestrians having to walk without the benefit of sidewalks and/or marked crossing locations. There is a lack of safe walking space, particularly at nighttime. A single signalized pedestrian crossing is provided on Route 134 at the Patriots Square/Market Place intersection and the existing crosswalk at the Route 134 and Theophilus F. Smith Road intersection is only on the minor street. The three existing sections of sidewalk that currently exist on Route 134 are:

- Shared use path on the western side of Route 134 (north of Bob Crowell Road)
- Sidewalk along the Route 134 bridge over Route 6
- Sidewalk along the eastern side of Route 134 from Patriots Square heading south to Upper County Road

Overall, there were five bicycle related crashes and one pedestrian related crash reported at the Route 134 intersections of Patriots Square/Market Place and Theophilus F. Smith Road. The majority of non-motorist crashes appear to involve the pedestrian or bicyclist disregarding the pedestrian signal indications. There are push button activated pedestrian phases at both of these intersections which are currently in working condition. Additionally, there is confusion as most of the bicycle crashes involve a bicycle traveling southbound along the sidewalk adjacent to the northbound lanes due to the lack of bicycle accommodations, which confused motorists at the intersections. There is a large portion of seasonal workers on Cape Cod during the summer peak season who do not have access to a vehicle and often travel by bicycle, walking and using transit. These seasonal workers may be foreign and not be familiar with roadway conditions and laws in Massachusetts.



**Image 3: Pedestrian walking along Route 134 on Route 6 overpass sidewalk**

### **Enhancements:**

- Construct an accessible connected sidewalk or shared use path along the entire corridor along both sides of Route 134. Ensure that marked crossings across Route 134 are provided where desire lines exist.
- Consider signing an alternate bicycle route on adjacent local roadways (i.e. Old Bass River Road) that are less congested, lower volume and lower speed.
- Coordinate educational resources and public outreach efforts with seasonal workers on bicycle safety, transit options and preferred bicycle routes.
- Add crosswalks at all legs of the intersections.
- Consider improving north/south connectivity for bicycles along Route 134 including providing separate bicycle facilities.
- Consider providing bicycle connection to the Cape Cod Rail Trail

### Safety Issue 4: Distracted Driving

#### **Observations:**

As Route 134 is a congested corridor, there were several crashes that involved drivers that were distracted or inattentive. As seen with the high occurrence of rear-end collisions within the RSA limits, a common distraction is the use of a cell phone while waiting at a red light or waiting in congestion.

#### **Enhancements:**

- Coordinate with Dennis Police Department to enforce distracted driving laws including the recently passed hands-free law.

## **Route 134 at Patriots Square/Market Place**

### Safety Issue 1: Signal Equipment and Visibility

#### **Observations:**

There were several issues discussed regarding the existing traffic signal system at the Route 134 and Patriots Square/Market Place intersection. During collection of the drone footage for the RSA, the signal loop for the northbound left turn lane was not working for three cycles even though there was a vehicle waiting on the vehicle detector. A large vehicle queue was created as vehicles were not being processed at the



**Image 4: Signal Heads without backplates**

signal. Eventually as cars left the queue in frustration, the re-shuffling of vehicles within the queue eventually re-actuated the signal phase and vehicles were then processed. The Town of Dennis has noted an issue with this signal detector loop recently, which may have been a contributing factor to crashes #13, 63.

As previously mentioned, the study area is a congested corridor that carries many heavy vehicles, including tractor trailers, delivery vehicles, public works and transit buses. Currently, the traffic signals along Route 134 are mounted overhead on mast arms, however, the side street approaches from Patriots Square and Market Place are pole-mounted. Due to the uphill gradient, presence of trucks and multiple lanes on both approaches, visibility can be limited for motorists from the two side streets. Limited visibility can contribute to red light running and rear end crashes.



**Image 5: Pedestal Pole Mounted Signal Heads**

There are no backplates on any of the signal heads, which may help alleviate crashes that were caused by glare (#28) and crashes where vehicles ran the red light (eight reported crashes). A structural analysis may be required to evaluate if backplates can be added to the existing traffic signal mast arms.

#### **Enhancements:**

- Resolve signal detector loop issues for the Route 134 northbound left turn lane.
- Install retroreflective backplates on all signal heads. (Note: a structural analysis may be required)
- Install additional street lighting.
- Install mast arms and mount the traffic signals overhead for the eastbound and westbound approaches to improve visibility.

#### **Safety Issue 2: Signal Operations/Geometry**

#### **Observations:**

There were several angle collisions that involved vehicles between the two minor approaches (#4,14,46). Currently, left turns are accommodated in an exclusive lane on each minor street approach and operate permissively along with the through movements. Without the protected phasing for the turning movements, there is additional confusion and friction caused between the opposing movements. Both approaches are also on an uphill gradient which may impact sight lines for approaching vehicles.

There were eight crashes that involved a vehicle from westbound Patriots Square channelized right turn lane. This lane operates under yield control and is not part of the signal. The angle of the channelized

turn lane makes it difficult for drivers to see approaching vehicles. Participants noted that there are a lot of near misses on both the eastbound and westbound channelized right turn lanes. The majority of those crashes involved a rear-end collision where the second vehicle thought the first vehicle had merged onto Route 134 but did not. One of the collisions within the westbound right turn lane resulted in a collision with a bicyclist who was traveling southbound within the Route 134 northbound lanes.

### **Enhancements:**

- Investigate installing protected/permissive left turn phasing or split phasing on the minor approaches.
- Install “yield on green” signs for east and west approaches
- Install a flashing yellow arrow signal head.
- Evaluate removing the channelized right turn lanes and incorporating the right turns into the signal.
- Consider geometric upgrades to the channelized right turn lanes to improve the deflection.

### Safety Issue 3: Multi-Modal Accommodations

#### **Observations:**

Pedestrian activity was observed during a previous site visit at this intersection where pedestrians and bicyclists were forced to walk within the roadway as there are gaps within the sidewalk network. The existing sidewalk on the eastern side of Route 134 terminates at this intersection with the signalized crosswalk. However, there is no connecting sidewalk into Patriots Square or Market Place. Additionally, there were three crashes at this intersection involving a non-motorist. Two of the crashes involved the non-motorist walking within the existing crosswalk but disregarding the pedestrian signal phase and indications. Excessive delay may cause pedestrian non-compliance at the signalized crosswalk. CCC Staff confirmed the pedestrian signal equipment was in working condition during a site visit. The crosswalk across Route 134 is very long – across five lanes of traffic. Currently, the pedestrian signal equipment and associated crosswalk and ramps do not meet current standards for Americans with Disabilities Act (ADA).



**Image 6: Pedestrian walking in roadway on Market Place**

The CCRTA currently has a transit stop within the Patriots Square shopping plaza. During the RSA, CCRTA staff noted that traveling through the shopping center adds additional time to their service. Additionally, CCRTA is looking at expanded bus service in the Route 134 area and there may be potential for transit service enhancements along this corridor.

### Enhancements:

- Reconstruct existing sidewalk and curb ramps.
- Install new connecting sidewalks into Patriots Square and Market Place.
- Consider relocating the crosswalk to the north side of the intersection and provide a refuge area, which would allow for a concurrent pedestrian phase with potentially a two-stage crossing.
- Upgrade pedestrian signal equipment to the latest standards, including countdown timers.
- Consider constructing a bus-pull off on Route 134 to improve service times for the CCRTA buses.
- If sidewalks are constructed along Route 134, install high visibility crosswalks on missing approaches along with pedestrian signal equipment.



**Image 7: Bicyclist traveling on Route 134 northbound**

### Safety Issue 4: Signage/Pavement Markings

#### Observations:

Continued discussions on the safety issues with the existing channelized right turn lanes also focused on the existing yield signage. Currently, there is one yield sign located on the right-hand side of each right turn lane in the eastbound and westbound directions. There are no pavement markings for left-turns from minor streets through intersection which can cause conflict given the phasing. However, participants noted that vehicles sometimes do not yield properly onto Route 134 and drive aggressively, potentially contributing to the rear-end crashes.

#### Enhancements:

- Consider upgrading the existing yield signs for the channelized right turn lanes with flashers. A second yield sign could be installed on the left-hand side.
- Consider replacing the yield signs with stop signs.
- Restripe the channelized right turn lanes to narrow the lane width and install yield pavement markings.
- Consider providing skip lines to delineate travel path for east/west left turns.



**Image 8: Westbound Channelized Right Turn Lane**

### Safety Issue 7: Access Management

#### **Observations:**

Access management was discussed with regards to the close proximity of commercial curb cuts to the traffic signal. Last minute braking on Route 134 to access these driveways may contribute to rear-end collisions. Currently, there is an approximately 70-foot-long raised median located on Market Place. Immediately after the median there are two curb cuts providing access to the Season's Gas Station and one curb cut providing access to the Ring Brothers Marketplace. The close proximity of these curb cuts can cause queuing along Market Place that may affect signal operations. As left turns are prohibited out of the gas station onto Route 134, all vehicles seeking to travel north on Route 134 must exit via a left turn onto Market Place to access the traffic signal.

#### **Enhancements:**

- Consider extending the center median on Market Place and convert the easternmost Season's Gas Station driveway to right turns only.

### Safety Issue 8: Route 6 Eastbound Off-Ramp to Route 134 Southbound Weave

#### **Observations:**

Route 134 provides direct access to Route 6 via a cloverleaf interchange between the Bob Crowell Road and Patriots Square/Market Place intersections. Within the interchange ramp area is where the second travel lane is dropped in the northbound direction and conversely a second travel lane is added in the southbound direction for vehicles merging on Route 134 from Route 6 eastbound. During the RSA, there was a focus on the operations and weaving between the Route 6 eastbound off-ramp and the Patriots Square/Market Place signalized intersection. There are two weaving patterns that exist between these two intersections. The first weave is for Route 134 southbound vehicles who need to change lanes to make a right turn onto Main Street. The second weave is for the Route 6 off-ramp vehicles who need to change lanes to make a left turn into Patriots Square. Additionally, there is the added friction of the Route 6 off-ramp vehicles merging freely onto Route 134 without yielding. The geometry of the off-ramp today allows vehicles to enter Route 134 with their own added lane.

There currently is a lack of advance signage for motorists to alert them of the lane changes associated with the Route 6 interchange which causes vehicles to make last minute lane changes. As seen in the collision diagram for Route 134 at Patriots Square/Market Place, there were six Route 134 southbound sideswipe collisions north of the intersection that may be related to lane changes and merges at the Route 6 interchange area. Last minute braking to access driveways may contribute to rear end crashes.

#### **Enhancements:**

- Investigate long-term one-way alternatives on Market Place (i.e. jughandle) to eliminate the southbound left turn lane weave to Patriots Square. All left turns would be relocated as a right

turn onto Main Street/Market Place and access Patriots Square as an eastbound through movement at the traffic signal.

- Consider installing a second yield sign and yield pavement markings for the Route 6 eastbound off ramp.
- Extend the solid white lane line from the Route 6 off-ramp merge point to minimize weaving.
- Consider possible signalization of the Route 6 Eastbound off-ramp to eliminate weaving.
- Install W4-3 warning signs to alert motorists on Route 134 and on the Route 6 eastbound off-ramp to Route 134 southbound of the added lane.
- Perform a review of the existing signage and pavement markings within the Route 6 interchange area. Install additional pavement markings and merging signage that would alert and remind motorists of the required lane changes.
- Consider replacing Route 134/Market Place signalized intersection with a modern roundabout and modify southbound lanes to minimize weaving.

## Route 134 at Theophilus F. Smith Road

### Safety Issue 1: Signal Visibility

There were several issues discussed regarding the existing traffic signal system at the Route 134 and Theophilus F. Smith Road intersection. The signal heads for the intersection are mounted overhead on mast arms on both of the Route 134 approaches but mounted on pedestal poles for the Theophilus F. Smith Road approach. The pole mounted signal heads may be frequently blocked due to large trucks that travel often on this roadway and may have been a contributing factor to crashes #3 and #36 where the westbound left turn ran a red light. Additionally, there are no backplates on any of the signal heads, which may help alleviate the high occurrence of rear end crashes and red light running.



**Image 9: Large Trucks Traveling on Theophilus F. Smith Road**

### **Enhancements:**

- Replace pole mounted signal heads for Theophilus F. Smith Road with mast arm signals.
- Install retroreflective backplates on all signal heads.

### Safety Issue 3: Multi-Modal Accommodations

#### **Observations:**

Pedestrians are accommodated at the signal with an exclusive pedestrian signal phase with an actuated push button. The existing sidewalk on the eastern side of Route 134 is in poor condition. Additionally, the pedestrian signal equipment and associated crosswalk and ramps do not meet current standards for ADA/AAB.

There were three crashes at this intersection involving a non-motorist. Two of the crashes involved the non-motorist walking within the existing crosswalk but disregarded the pedestrian signal phase and indications. One rear end crash was the result of a vehicle stopping for a bicyclist who disregarded the signal phase. Another crash involved a bicycle traveling southbound on the sidewalk. Excessive delay may cause the pedestrian/bicyclist non-compliance. Additionally, vehicles likely encroach on the crosswalk when approaching the intersection to make a right turn on red and may not notice a pedestrian/bicyclist approaching the crosswalk.



**Image 10: Poor condition of existing sidewalk and curb ramp**

#### **Enhancements:**

- Reconstruct existing sidewalk and curb ramps.
- Upgrade pedestrian signal equipment to the latest standards, including countdown timers.
- If sidewalks are constructed along Route 134, install high visibility crosswalks on missing approaches along with pedestrian signal equipment.

### Safety Issue 4: Pavement Markings

#### **Observations:**

Even though no crashes directly relate to this issue, participants noted motorists are often confused with the existing TWLTL pavement markings and layout on Route 134 which terminates in close proximity to the Theophilus F. Smith Road intersection. It was noted that some westbound vehicles travel over the scored concrete median TWLTL terminus when turning left. However, no reported crashes appear to be related to the TWLTL.

There were several sideswipe crashes on Route 134 southbound in the vicinity of the Cumberland Farms driveway related to confusion of left turns intended for Theophilus F. Smith Road versus left turns turning into Cumberland Farms. This may also contribute to rear end crashes as drivers may not expect vehicles to stop prior to the stop line for the left turn lane. Currently, there is an approximate 340-foot-long

southbound left turn lane which serves left turns for both the Cumberland Farms driveway and Theophilus F. Smith Road, however, there is no lane striping or signage indicating what is allowed.

#### Enhancements:

- Install a left turn skip lane line for westbound left turns to guide them to Route 134 southbound.
- Review and update TWLTL striping and layout to the most current standards.
- Investigate potential striping improvements for the Route 134 southbound left turn lane to delineate left turns destined to Cumberland Farms versus left turns destined to Theophilus F. Smith Road.



**Image 11: Two Way Left Turn Lane on Route 134**

#### Safety Issue 5: Access Management

##### Observations:

Access management was a key discussion item for the Theophilus F. Smith Road intersection. The commercial parcels of Cumberland Farms, Mobil Gas, Mid Cape Home Centers and Enterprise Road are all commercial parcels in close proximity to the intersection that cause additional friction and conflict points along the roadway. The Cumberland Farms parcel was redeveloped sometime between 2013 and 2014 and the driveways were consolidated, and some crashes may no longer be directly applicable (#2, #4). Previously there were two Cumberland Farms driveways along Route 134 north of the intersection which was reduced to one driveway with exiting left turns restricted by the installation of a concrete mountable island. However, the condition of the island is currently in poor condition. The Cumberland Farms driveway on Theophilus F. Smith Road appears to remain in the same location but is intended to be restricted to only right turns with the presence of a channelized island. Participants also noted there used to be a sign restricting turns for this driveway, but it has been frequently knocked over. Four crashes were related to turning movements at the Cumberland Farms driveway on Theophilus F. Smith Road (#19, 24, 37, 40). Additionally, two rear-end crashes (#13, 22) seem to be related to the vehicle queuing resulting from the commercial driveways on Theophilus F. Smith Road.

Five crashes (#16, 32, 38, 43, 49) were related to the turning movements at the Mid-Cape Home Center driveway, with the majority involving vehicles exiting onto Route 134. The existing Mid-Cape Home driveway is located approximately 180 feet south of the Theophilus F. Smith Road intersection and is approximately 75 feet wide with a small five-foot center island. The driveway is used by heavy vehicles as well as passenger cars to access the lumber yard in the rear.

There were several courtesy crashes involving vehicles exiting the Mobil Gas driveway (#21, 23). The courtesy crash which involved a vehicle in the rightmost Route 134 northbound lane allowing a vehicle to

exit Mobil, but the leftmost Route 134 northbound lane was unaware as their view was blocked by the other vehicle and could not stop in time.

### Enhancements:

- Consider installing a median on Theophilus F. Smith Road to minimize conflicts from adjacent commercial driveways.
- Consider minor signage and striping improvements to the adjacent commercial driveways.
- Consider narrowing and removing the center island from the existing Mid-Cape Home Center driveway.
- Consider long-term improvements for a new Mid-Cape Home Center driveway (i.e., new enter only driveway upstream of signal or incorporating a new driveway into the signalized intersection). This enhancement may be infeasible since it likely requires major modification to the building.
- Consider installing a median on Route 134 between Market Place and Theophilus F. Smith Road to minimize conflicts from commercial driveways.
- Encourage the use of shared driveways and/or internal driveways between commercial properties along Route 134.



**Image 12: Mid-Cape Home Center Driveway**

## Route 134 at Bob Crowell Road/Hemlock Lane

### Safety Issue 1: Signal Equipment/Operations

Route 134 northbound left turns are accommodated via a protected/permissive signal phase within an exclusive left turn lane. The signal head display for this movement is currently a doghouse style signal display. Three collisions (#7, 17, 34) occurred between a northbound left turn movement not yielding to a Route 134 southbound vehicle under the permissive phase. Note, left turns from Route 134 southbound only operate under a permissive phase (there is no protected phase). Additionally, the signal heads are not aligned with the lanes in the southbound direction and may have been a contributing factor to crash #19.

During a site visit, CCC Staff observed the signal phase for Bob Crowell Road being called even though there were no vehicles waiting at the stop bar. Further observations revealed that Route 134 northbound left turning vehicles were taking a sharp left turn traveling over the double yellow centerline on Bob

Crowell Road and triggering the vehicle detector. This occurrence likely contributed to additional congestion and queuing on Route 134 southbound due to the signal operating inefficiently. In turn, the congestion on Route 134 southbound was likely a contributing factor to the eleven Route 134 southbound rear-end collisions.

There was a discussion that noted the two minor roads of Bob Crowell Road and Hemlock Lane are not currently aligned properly. By realigning Bob Crowell Road to the south slightly within the channelized traffic island there is the potential that this modification could alleviate the issue with the Bob Crowell Road vehicle detector being triggered accidentally.

#### **Enhancements:**

- Install flashing yellow arrow signal display for permissive left turns.
- Relocate eastbound left turn lane vehicle detector.
- Add a minimal delay to the eastbound left turn vehicle detector.
- Install dotted lane extension lines for the Route 134 northbound left turn to Bob Crowell Road.
- Install scored concrete island on Bob Crowell Road to avoid northbound left turn to cross double yellow line.
- Relocate the northbound stop bar closer to the intersection to help with guide the travel path of left turning vehicles onto Bob Crowell Road.
- Consider realigning Bob Crowell Road slightly to the south to improve offset from Hemlock Lane (Note: the current configuration provides offset left-turn movements).

#### **Safety Issue 3: Channelized Right Turn Lane**

##### **Observations:**

The most prevalent type of crash at the Route 134 and Bob Crowell Road intersection was the ten rear end collisions which occurred in the eastbound channelized right turn lane. The majority of those crashes involved a rear-end collision where the second vehicle thought the first vehicle had merged onto Route 134 but did not. One rear-end crash noted that their visibility was limited due to the curvature of the roadway. RSA participants noted that there is a heavy tree cover in the southwest quadrant of the intersection that likely causes shadowing on Bob Crowell Road and may be restricting sight lines. It should be noted that the parcel of land in the southwest quadrant of the intersection is



**Image 13: Bob Crowell Road Channelized Right Turn Lane**

owned by the Town of Dennis Water Department. It was also noted that vehicles on Bob Crowell Road may be traveling too fast as they are approaching the intersection and may not be aware of vehicles queued in the right turn lane, which does not currently accommodate the existing queues. Due to the uphill grade at this lane, drivers may have foot on accelerator to avoid rolling back possibly contributing to rear end crashes. The uphill gradient also results in stopped vehicles not having their braking lights on which may cause vehicles to think the vehicle in front of them are merging/moving).

### Enhancements:

- Restripe the channelized right turn lane to narrow the lane width and install yield pavement markings (Note: minimum channelized island width needs to be about 20 feet to meet standards).
- Add Right Turn Only Arrow pavement markings.
- Evaluate removing the channelized right turn lanes and incorporating the right turns into the signal.
- Consider providing an acceleration lane on Route 134 southbound for the channelized right turn lane.
- Extend right turn lane on Bob Crowell Road.
- Consider geometric upgrades to the channelized right turn lane to improve deflection and/or improve grading.
- Perform tree trimming in the southwest quadrant to improve sight lines.
- Install a Signal Ahead warning sign (W3-3) on Bob Crowell Road to assist with speed reduction.

### Safety Issue 4: Multi-Modal Accommodations

#### Observations:

Multi-modal accommodations do not currently exist within the Route 134 and Bob Crowell Road intersection. There is currently a shared use path on the western side of Route 134 (north of Bob Crowell Road) and a sidewalk on the northern side of Bob Crowell Road. However, there are no crosswalks, ramps or pedestrian signal accommodations provided at the intersection. RSA participants noted that there is currently pedestrian activity at the intersection as there is a desire line to continue south on Route 134 to the Patriots Square commercial area. South of Bob Crowell Road, there is only a small section of sidewalk on the Route 6 overpass, so pedestrians are forced to walk in the road or within the small grass shoulder. There are pedestrian desire lines between the large residential neighborhood from



**Image 14: Existing Pedestrian Activity at Bob Crowell Road intersection**

Hemlock Lane to recreation facilities on Bob Crowell Road and to the Patriots Square commercial area, but there currently no crosswalks are provided at the intersection to connect to the existing sidewalk network.

**Enhancements:**

- Install sidewalks, pedestrian signals, push buttons with high visibility crosswalks and accessible curb ramps at the intersection.

Safety Issue 6: Visibility

**Observations:**

There were five crashes that occurred during nighttime conditions. Two of the nighttime crashes occurred at the channelized right turn lane. Currently, there is only one overhead lighting fixture mounted to a utility pole in the northwest corner of the intersection.

**Enhancements:**

- Evaluate intersection lighting needs.

Safety Issue 7: Drainage

**Observations:**

The crash summaries indicated there were four crashes that were related to wet pavement (#1, 16, 29, 31). About 26% of reported crashes occurred under wet road conditions. During a CCC field visit, there was some visible puddling in the northeast corner of the intersection which could result in icy or wet conditions. Additionally, there was one out of control crash in the northeast corner where it was indicated that the steering wheel had locked up.

**Enhancements:**

- Investigate potential drainage issues in the throughout the intersection

## Summary of Road Safety Audit

The final part of the RSA included the discussion of potential safety enhancements to address the identified safety deficiencies. The range of safety enhancements included both short-term, low cost improvements as well as long-term and higher cost recommendations. Table 2 presents a summary of the estimated time frames and preliminary costs associated with each potential safety enhancement.

Table 3 presents a summary of the Road Safety Audit observations and enhancements to assist in the design and/or implementation of potential improvements elicited during the process. It is also recommended that any design process for more involved geometric changes include further analysis and public input. Safety payoff estimates are subjective judgement of the potential effectiveness of the potential enhancement.

**Table 2: Estimated Time Frame and Costs Breakdown**

Time Frame		Costs	
Short-Term	<1 Year	Low	<\$10,000
Mid-Term	1-3 Years	Medium	\$10,001-\$50,000
Long-Term	>3 Years	High	>\$50,000

Table 3: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
<b>Route 134 Corridor Wide</b>					
Corridor Operations	Upgrade signal coordination between Patriots Square and Theophilus F. Smith Rd	Medium	Mid-Term	Medium	Town
Corridor Operations	Upgrade all 3 traffic signals to adaptive signals	Medium	Long-Term	High	Town
Corridor Operations	Review need to add additional capacity at signalized intersections and along the corridor in the future	High	Long-Term	High	Town
Corridor Operations	Review vehicular and pedestrian clearance intervals	Medium	Short-Term	Low	Town
Corridor Operations	Update signal timing for summer months	Medium	Short-Term	Low	Town
Corridor Operations	Increase enforcement of red light running	High	Short-Term	Low	Town
Emergency Response	Install emergency pre-emption at all 3 traffic signals (note: structural evaluation may be required)	High	Mid-Term	Medium	Town
Multi-Modal Accommodations	Construct an accessible sidewalk, or shared use path along the entire corridor on both sides	High	Long-Term	High	Town/MassDOT
Multi-Modal Accommodations	Consider signing alternative bicycle routes on local roadways (i.e. Old Bass River Rd)	Low	Short-Term	Low	Town
Multi-Modal Accommodations	Coordinate educational resources and public outreach efforts with seasonal workers on bicycle safety, transit options and preferred bicycle routes.	Low	Short-Term	Low	Town/MassDOT
Multi-Modal Accommodations	Add crosswalks at all legs of the intersections	High	Long-Term	High	Town

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
<b>Route 134 Corridor Wide (continued)</b>					
Multi-Modal Accommodations	Consider providing separate bicycle facilities on Route 134	High	Long-Term	High	Town/MassDOT
Multi-Modal Accommodations	Consider bicycle connection to the Cape Cod Rail Trail	High	Long-Term	High	Town
Distracted Driving	Enforcement of distracted driving laws	High	Mid-Term	Low	MassDOT/Town
<b>Route 134 @ Patriots Square/Market Place</b>					
Signal Equipment and Visibility	Resolve signal detector loop issues for Route 134 northbound left turn lane	Low	Short-Term	Low	Town
Signal Equipment and Visibility	Install retroreflective backplates (note: structural evaluation may be required)	Medium	Short-Term	Low	Town
Signal Equipment and Visibility	Install additional street lighting	Medium	Mid-Term	Medium	Town
Signal Equipment and Visibility	Install Mast arms on the side streets to improve signal visibility	High	Long-Term	High	Town
Signal Operations/Geometry	Investigate installing protected/permissive left turn phasing or split phasing on the minor approaches	High	Mid-Term	Medium	Town
Signal Operations/Geometry	Install “left turn yield on green” signs for minor approaches	Medium	Short-Term	Low	Town
Signal Operations/Geometry	Install flashing yellow arrow signal heads	Medium	Short-Term	Medium	Town
Signal Operations/Geometry	Evaluate removing channelized right turn lanes and incorporating right turns into the signal	High	Long-Term	High	Town
Signal Operations/Geometry	Consider geometric upgrades to channelized right turn lanes to improve deflection	Medium	Mid-Term	Medium	Town

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
<b>Route 134 @ Patriots Square/Market Place (continued)</b>					
Multi-Modal Accommodations	Reconstruct existing Route 134 sidewalk and curb ramps	High	Mid-Term	High	Town
Multi-Modal Accommodations	Install new connecting sidewalks into Patriots Square and Market Place	High	Mid-Term	Medium	Town
Multi-Modal Accommodations	Consider relocating crosswalk to the north side of the intersection with a pedestrian refuge area and implement a two-stage crossing	Medium	Long-Term	Medium	Town
Multi-Modal Accommodations	Upgrade pedestrian signal equipment, including countdown timers	High	Mid-Term	Medium	Town
Multi-Modal Accommodations	Consider constructing a bus pull-off on Route 134	Low	Long-Term	Medium	Town/CCRTA
Multi-Modal Accommodations	Install highly visible crosswalks on missing approaches when sidewalks are constructed	High	Long-Term	Low	Town
Signage/Pavement Markings	Consider upgrading the yield signs for the channelized right turn lanes with flashers	Low	Short-Term	Low	Town
Signage/Pavement Markings	Consider replacing yield signs with stop signs on the channelized right turn lanes	Low	Short-Term	Low	Town
Signage/Pavement Markings	Restripe channelized right turn lanes to narrow width and install yield lines	Medium	Short-Term	Low	Town
Signage/Pavement Markings	Consider providing skip lines to delineate travel path for left turns	Medium	Short-Term	Low	Town
Access Management	Consider extending center median on Market Place	Medium	Mid-Term	High	Town

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
<b>Route 134 @ Patriots Square/Market Place (continued)</b>					
Route 6 Eastbound Off-Ramp to Route 134 Southbound weave	Consider long-term improvements to alleviate the weave from the Route 6 eastbound off ramp to Route 134 southbound to Patriots Square and Main St (i.e., jughandle)	High	Long-Term	High	MassDOT/Town
Route 6 Eastbound Off-Ramp to Route 134 Southbound weave	Consider installing a second yield sign and yield pavement markings for the Route 6 eastbound off ramp	Low	Short-Term	Low	MassDOT
Route 6 Eastbound Off-Ramp to Route 134 Southbound weave	Extend the solid white lane line from the Route 6 off-ramp merge point to minimize weaving	Low	Short-Term	Low	MassDOT
Route 6 Eastbound Off-Ramp to Route 134 Southbound weave	Consider possible signalization of the Route 6 Eastbound off-ramp to eliminate weaving	Medium	Long-Term	High	MassDOT
Route 6 Eastbound Off-Ramp to Route 134 Southbound weave	Install W4-3 warning signs	Low	Short-Term	Low	MassDOT
Route 6 Eastbound Off-Ramp to Route 134 Southbound weave	Review and install additional Route 6 interchange advance signage and pavement markings	Medium	Short-Term	Low	MassDOT
Route 6 Eastbound Off-Ramp to Route 134 Southbound weave	Consider replacing signalized intersection with a modern roundabout	High	Long-Term	High	Town
<b>Route 134 @ Theophilus F. Smith Road</b>					
Signal Visibility	Install Mast arms on the side streets to improve signal visibility	High	Long-Term	High	Town
Signal Visibility	Install retroreflective backplates	Medium	Short-Term	Low	Town
Multi-Modal Accommodations	Reconstruct existing sidewalk and curb ramps to the latest standards	High	Mid-Term	High	Town

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
<b>Route 134 @ Theophilus F. Smith Road (continued)</b>					
Multi-Modal Accommodations	Upgrade pedestrian signal equipment, including countdown timers	High	Mid-Term	Medium	Town
Multi-Modal Accommodations	Install highly visible crosswalks on missing approaches when sidewalks are constructed	High	Long-Term	Low	Town
Pavement Markings	Install left turn skip lane lines for westbound left turns	Medium	Short-Term	Low	Town
Pavement Markings	Update TWLTL striping and layout to the most current standards	Low	Mid-Term	Low	Town
Pavement Markings	Investigate potential striping improvements for the Route 134 southbound left turn lane to delineate left turns destined to Cumberland Farms versus left turns destined to Theophilus F. Smith Road.	Medium	Mid-Term	Low	Town
Access Management	Consider installing a median on Theophilus F. Smith Rd to minimize conflicts from adjacent commercial driveways	High	Long-Term	High	Town
Access Management	Consider signage and striping improvements to the adjacent commercial driveways	Low	Short-Term	Low	Town/Property Owners
Access Management	Consider narrowing and removing the center island from the existing Mid-Cape Home driveway	Low	Mid-Term	Medium	Town/Property Owner
Access Management	Consider long-term improvements for a new Mid-Cape Home Center driveway (new enter-only driveway or incorporating into the signal)	High	Long-Term	High	Town/Property Owner

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
<b>Route 134 @ Theophilus F. Smith Road (continued)</b>					
Access Management	Consider installing a median on Route 134 between Market Place and Theophilus F. Smith to minimize conflicts from commercial driveways	High	Long-Term	High	Town
Access Management	Encourage the use of shared driveways and/or internal driveways between commercial properties along Route 134	High	Long-Term	Low	Town
<b>Route 134 @ Bob Crowell Road</b>					
Signal Equipment/Operations	Install flashing yellow arrow signal displays	Medium	Short-Term	Medium	Town
Signal Equipment/Operations	Relocate eastbound left turn vehicle detector	Low	Short-Term	Low	Town
Signal Equipment/Operations	Add a minimal delay to the eastbound left turn vehicle detector	Low	Short-Term	Low	Town
Signal Equipment/Operations	Install dotted lane extension lines for Route 134 northbound left turn to Bob Crowell Rd	Low	Short-Term	Low	Town
Signal Equipment/Operations	Install scored concrete island on Bob Crowell	Low	Mid-Term	Medium	Town
Signal Equipment/Operations	Relocate northbound stop bar closer to intersection	Low	Short-Term	Low	Town
Signal Equipment/Operations	Consider realigning Bob Crowell slightly to the south to improve offset from Hemlock Ln	Medium	Mid-Term	Medium	Town
Channelized Right Turn Lane	Restripe channelized right turn lane to narrow width and install yield lines	Medium	Short-Term	Low	Town
Channelized Right Turn Lane	Install Right Turn Arrow pavement markings	Low	Short-Term	Low	Town

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
<b>Route 134 @ Bob Crowell Road (continued)</b>					
Channelized Right Turn Lane	Evaluate removing channelized right turn lane on Bob Crowell Rd and incorporating right turns into the signal	High	Long-Term	High	Town
Channelized Right Turn Lane	Consider providing an acceleration lane on Route 134 southbound for the channelized right turn lane	High	Long-Term	Medium	MassDOT/Town
Channelized Right Turn Lane	Consider geometric upgrades to channelized right turn lanes to improve deflection and/or improve grading	Medium	Long-Term	Medium	Town
Channelized Right Turn Lane	Perform tree trimming in southwest quadrant to improve sight lines	Medium	Short-Term	Low	Town
Channelized Right Turn Lane	Install Signal Ahead sign (W3-3) on Bob Crowell Rd to assist with slowing vehicles down	Low	Short-Term	Low	Town
Multi-Modal Accommodations	Install sidewalks, pedestrian signals, push buttons with high visible crosswalks and accessible curb ramps	High	Long Term	High	Town
Visibility	Evaluate intersection lighting needs	Medium	Mid-Term	Medium	MassDOT/Town
Drainage	Investigate potential drainage issues throughout the intersection	Low	Short-Term	Low	Town

## Appendix A. RSA Meeting Agenda

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# Agenda

## Road Safety Audit

Dennis, MA

Route 134 High Crash Intersections: Bob Crowell Rd,  
Patriots Square and Theophilus F Smith Rd

ZOOM Link: <https://capecodcommission.org/transportation/join>

Tuesday, December 15, 2020

1:00PM – 4:00PM

**Type of meeting:** High crash locations – Road Safety Audit  
**Attendees:** Invited participants to comprise a multidisciplinary team  
**Please bring:** Thoughts and enthusiasm!!

**1:00 PM** Welcome and Introductions

**1:15 PM** Discussion of Safety Issues

- Crash history, speed regulations, recent and existing projects – all provided in advance
- Existing geometries and conditions

**2:15 PM** Virtual Site Visit

- View video footage of intersections and corridor
- As a group, identify areas for improvement

**3:00 PM** Discussion of Potential Improvements

- Discuss observations and finalize safety issue areas
- Discuss potential improvements and finalize recommendations

**4:00 PM** Adjourn for the Day – but the RSA has not ended

### Instructions for Participants:

- Before attending the RSA on December 15, 2020, participants are encouraged to drive/walk through the intersection and complete/consider elements on the RSA Prompt List with a focus on safety.
- All participants will be actively involved in the process throughout. Participants are encouraged to come with thoughts and ideas, but are reminded that the synergy that develops and respect for others' opinions are key elements to the success of the overall RSA process.
- After the RSA meeting, participants will be asked to comment and respond to the document materials to assure it is reflective of the RSA completed by the multidisciplinary team.

## Appendix B. RSA Audit Team Contact List

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## Participating Audit Team Members

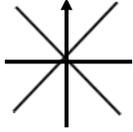
Date: Dec 15, 2020      Location: Dennis, MA

<b>Audit Team Members</b>	<b>Agency/Affiliation</b>	<b>Email Address</b>
Tom Andrade	Town of Dennis – Town Engineer	tandrade@town.dennis.ma.us
David Johansen	Town of Dennis – DPW Director	djohansen@town.dennis.ma.us
Greg Rounseville	Town of Dennis – Assistant Town Administrator	grounseville@town.dennis.ma.us
Cleve Daniels	Town of Dennis – Deputy Chief of Police	cdaniels@town.dennis.ma.us
Dan Fortier	Town of Dennis – Town Planner	dfortier@town.dennis.ma.us
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Joseph Rodricks	Stantec	jarodricks52@gmail.com
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Jason Walters	MassDOT District 5 Projects	Jason.Walters@dot.state.ma.us
Ana Fill	MassDOT Traffic & Safety Engineering	ana.fill@state.ma.us
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Ale Kuncaitis	MassDOT District 5 Highway	
Jason Dvelis	FHWA	Jason.dvelis@dot.gov
Sean Polay	Cape Cod Joint Transportation Committee Bicycle Representative	sean.polay@gmail.com
Noah Berger	Cape Cod Regional Transit Authority	nberger@capecodrta.org
Colleen Medeiros	Cape Cod Commission	colleen.medeiros@capecodcommission.org
Steven Tupper	Cape Cod Commission	stupper@capecodcommission.org
David Nolan	Cape Cod Commission	david.nolan@capecodcommission.org
Lev Malakhoff	Cape Cod Commission	lmalakhoff@capecodcommission.org

## Appendix C. Detailed Crash Data

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# Collision Diagram



Indicate North by arrow

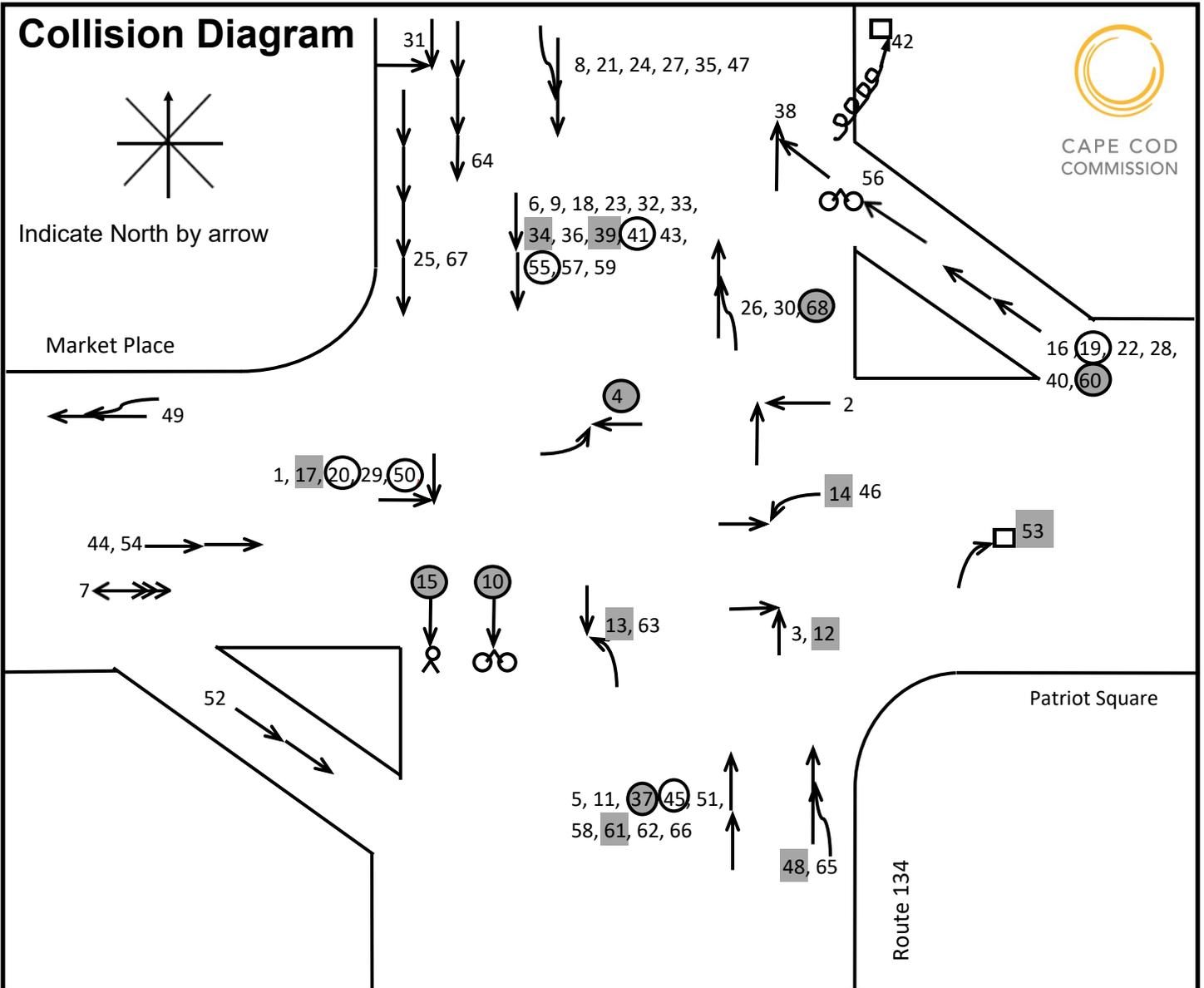


CAPE COD COMMISSION

Market Place

Patriot Square

Route 134



## SYMBOLS

- Moving Vehicle
- Backing Vehicle
- Non-involved Vehicle
- Pedestrian
- Bicyclist
- Parked Vehicle
- Fixed Object
- Fatal Crash
- Injury Crash
- Night Time Crash

## TYPES OF COLLISIONS

- Rear-End
- Head On
- Side Swipe
- Out of Control
- Turning Movement
- Right Angle

## CRASH INFORMATION

Each crash is labeled with a Crash# and additional information is included on the crash summary.

### Notes:

Total Crashes: 68  
 Injury Crashes: 11  
 Fatality Crashes: 0

INTERSECTION: Route 134 AND Market Place, Dennis, MA

CRASHES FROM 2013 TO 2017

Analysis prepared: 5/13/20

**Crash Data Summary Table**  
Route 134 at Patriot Square/Market Street, Dennis, MA  
2013 - 2017

Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	Driver Distracted By	Injury Severity	D1 Age	D2 Age	D3 Age	D4 Age	Comments
#	mm/dd/yy	Day	hh:mm	Type	Type	Type	Type	Type	Type	Type	#	#	#	#	
1	01/01/13	Tuesday	3:24 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	Unknown	No Injury	18	68			MV1 ran red light in the southbound direction and struck MV2. OP1 stated something fell from mirror and he did not see red light.
2	01/02/13	Wednesday	3:31 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	NA	No Injury	68	29			MV2 ran red light in the northbound direction and struck MV1. OP2 stated light was yellow; OP1 and witness stated MV2 ran red light.
3	03/14/13	Thursday	12:58 PM	Angle	Daylight	Cloudy	Dry	Disregarded traffic signs, signals, road markings	Unknown	No Injury	17	27			MV1 ran red light in the northbound direction and struck MV2
4	03/18/13	Monday	10:29 PM	Angle	Dark - lighted roadway	Snow	Wet	Failed to yield right of way	Unknown	Non-fatal injury	20	40			MV2 was attempting to turn left onto Route 134 North and failed to yield to MV1 who was headed west to Market Place. MV2 was noted to be operating under the influence.
5	03/23/13	Saturday	6:10 PM	Rear-end	Daylight	Clear	Dry	Inattention	NA	No Injury	50	69			MV1 rear-ended MV2 while taking her eyes off the road
6	05/17/13	Friday	4:10 PM	Rear-end	Daylight	Clear	Dry	Other improper action	NA	No Injury	70	45			MV2 rear-ended MV1 as the operator's foot was stuck between the pedals
7	07/03/13	Wednesday	10:40 AM	Angle	Daylight	Clear	Dry	Visibility obstructed	NA	No Injury	60	42			MV1 backs into MV2 while trying to change lanes
8	08/02/13	Friday	8:39 AM	Sideswipe, same direction	Daylight	Cloudy	Dry	Exceeded authorized speed limit	Unknown	No Injury	29				MV2 sideswiped MV1 while trying to change lanes
9	08/03/13	Saturday	12:14 PM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	No Injury	60	65			MV2 rear-ended MV1 as the operator's foot came off the brake accidentally
10	09/18/13	Wednesday	9:19 PM	Angle	Dark - lighted roadway	Clear	Dry	Failed to yield right of way	Unknown	Non-fatal injury	51	17			Bicyclist struck MV1 while attempting to cross Route 134. Bicyclist was within the marked crosswalk, but disregarded the pedestrian signal indications
11	10/08/13	Tuesday	4:53 PM	Rear-end	Daylight	Clear	Dry	Inattention	NA	No Injury	25	62			MV2 failed to stop for traffic and rear-ended MV1
12	10/26/13	Saturday	8:31 PM	Angle	Dark - lighted roadway	Clear	Dry	No improper driving	Unknown	No Injury	47	47			Eastbound MV1 struck northbound MV2. Both operators stated they had the green light.
13	11/27/13	Wednesday	4:44 PM	Angle	Dark - lighted roadway	Rain	Wet	Disregarded traffic signs, signals, road markings	Unknown	No Injury	63	64			Southbound MV1 struck MV2 who disregarded the red arrow left turn signal. OP2 stated entered intersection while arrow was green but that it may have changed to red.
14	12/24/13	Tuesday	5:43 PM	Angle	Dark - lighted roadway	Clear	Dry	Inattention	Unknown	No Injury	18	22			Eastbound MV1 struck MV2 who was making a westbound left turn
15	01/07/14	Tuesday	8:07 PM	Single vehicle crash	Dark - lighted roadway	Clear	Dry	No improper driving	Unknown	Non-fatal injury	56				MV1 struck a pedestrian crossing Route 134 with a marked crosswalk. Operator of MV1 stated she had a green light.
16	02/07/14	Friday	12:51 PM	Rear-end	Daylight	Clear	Dry	No improper driving	Unknown	No Injury	51	44			MV2 rear-ended MV1 thinking they had merged into traffic
17	02/16/14	Sunday	5:17 PM	Angle	Dark - lighted roadway	Clear	Wet	No improper driving	Unknown	No Injury	59	31			Southbound MV1 struck eastbound MV2. Both operators stated they had a green light.
18	03/22/14	Saturday	2:38 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	Unknown	No Injury	35	36			MV1 rear-ended MV2 while stopped at a red light. Light had turned green.
19	04/12/14	Saturday	10:30 AM	Rear-end	Daylight	Clear	Dry	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner	Not distracted	Non-fatal injury	60	40			MV2 rear-ended MV1 and left the scene of the collision
20	05/23/14	Friday	12:36 PM	Angle	Daylight	Clear	Dry	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner	Not distracted	Non-fatal injury	24	24			Southbound MV2 ran the red light and struck eastbound MV1.
21	05/23/14	Friday	1:06 PM	Sideswipe, same direction	Daylight	Clear	Dry	Unknown	Unknown	No Injury	25	24			MV2 sideswiped MV1 who was trying to change lanes due to a crash ahead.
22	05/29/14	Thursday	6:01 PM	Rear-end	Daylight	Clear	Dry	Inattention	External distraction (outside the vehicle)	No Injury	71	43			MV2 rear-ended MV1 thinking they were moving ahead
23	07/04/14	Friday	9:34 AM	Rear-end	Daylight	Cloudy	Dry	Inattention	Not distracted	No Injury	44	44			MV2 could not stop in time for red light and rear-ended MV1. OP2 not paying attention and thought MV1 was going through intersection.
24	07/22/14	Tuesday	4:26 PM	Sideswipe, same direction	Daylight	Clear	Dry	Inattention	NA	No Injury	52	58			MV2 sideswiped MV1 while attempting to merge into the left turn lane
25	07/27/14	Sunday	12:04 PM	Rear-end	Daylight	Cloudy	Dry	Inattention	NA	No Injury	41	69	64	39	MV4 failed to stop for traffic waiting in left turn lane and rear-ended MV3 who then rear-ended MV2 who then rear-ended MV1
26	08/02/14	Saturday	4:29 PM	Sideswipe, same direction	Daylight	Rain	Wet	Inattention	Not distracted	No Injury	64	44			MV1 sideswiped MV2 while attempting to change lanes into the left lane
27	08/20/14	Wednesday	2:13 PM	Sideswipe, same direction	Daylight	Clear	Dry	Made an improper turn	NA	No Injury	26	73			MV2 sideswiped MV2 while attempting to change lanes
28	08/25/14	Monday	5:04 PM	Rear-end	Daylight	Clear	Dry	Glare	Not distracted	No Injury	80	74			MV1 rear-ended MV2 due to glare
29	09/02/14	Tuesday	2:18 PM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	Not distracted	No Injury	25	43	55		MV3 traveling eastbound failed to stop for the red light and struck southbound MV1 who then sideswiped MV2. OP3 stated had yellow light.
30	09/10/14	Wednesday	4:38 PM	Sideswipe, same direction	Daylight	Clear	Dry	Inattention	NA	No Injury	38	82			MV2 did not see MV1 and sideswiped MV1 while attempting to change lanes from Patriots Square right turn slip lane to Route 134 left turn lane
31	10/06/14	Monday	3:22 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	NA	No Injury	18	47			MV1 struck MV2 while exiting Shell gas station and attempting to enter southbound left turn lane
32	11/15/14	Saturday	3:05 PM	Rear-end	Daylight	Clear	Dry	Other improper action	Not distracted	No Injury	59	44			MV1 rear-ended MV2 as the operator's foot slipped off brake pedal
33	11/26/14	Wednesday	7:46 PM	Rear-end	Dark - lighted roadway	Rain	Wet	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc.	Unknown	No Injury	21	68			In an attempt to avoid a sideswipe collision with an unknown vehicle, MV2 changed lanes abruptly and rear-ended MV1 who was stopped at the red light.
34	12/30/14	Tuesday	4:07 PM	Rear-end	Daylight	Clear	Dry	Inattention	Not distracted	No Injury	41	51			MV2 rear-ended MV1. Operator of MV2 saw the left turn arrow signal turn green and began to accelerate even though the signal indication was still red for through traffic
35	01/20/15	Tuesday	3:23 PM	Sideswipe, same direction	Daylight	Clear	Dry	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc.	NA	No Injury	59	82			MV2 failed to slow for red light traffic and sideswiped MV1 while trying to avoid a rear-end collision in their lane
36	03/01/15	Sunday	5:41 PM	Rear-end	Dark - lighted roadway	Snow	Snow	Driving too fast for conditions	Unknown	No Injury	29	48			MV1 rear-ended MV2 who was stopped in traffic
37	03/03/15	Tuesday	10:43 PM	Rear-end	Dark - lighted roadway	Snow	Snow	Inattention	Unknown	Non-fatal injury	33	26			MV2 failed to stop and rear-ended MV1
38	03/11/15	Wednesday	2:56 PM	Angle	Daylight	Clear	Dry	Inattention	Not distracted	No Injury	34	81			MV2 struck MV1 while trying to merge onto Route 134 from Patriots Square
39	06/17/15	Wednesday	3:36 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	Unknown	Non-fatal injury	50	44			MV2 rear-ended MV1. OP2 indicated that left-turn arrow turned to green and thought all traffic was moving.
40	06/19/15	Friday	5:34 PM	Rear-end	Daylight	Clear	Dry	Inattention	NA	No Injury	19	71			MV2 rear-ended MV1 thinking they had merged into traffic
41	06/21/15	Sunday	2:34 PM	Rear-end	Daylight	Cloudy	Wet	Inattention	Unknown	No Injury	63	22			MV2 rear-ended MV1 after their foot slipped off the brake
42	06/23/15	Tuesday	7:35 PM	Single vehicle crash	Daylight	Rain	Wet	Operating defective equipment	NA	No Injury	38				MV1 failed to stop for traffic due to bald tires on wet pavement and struck a fence and down an embankment
43	06/28/15	Sunday	1:22 PM	Rear-end	Daylight	Cloudy	Wet	Inattention	Unknown	No Injury	24	19			MV2 rear-ended MV1 once red light turned to green
44	07/22/15	Wednesday	5:57 PM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	No Injury	80	75			MV1 rear-ended MV2 while stopped at red light
45	08/12/15	Wednesday	11:42 AM	Rear-end	Daylight	Clear	Dry	Followed too closely	Unknown	Non-fatal injury	54	36			MV1 rear-ended MV2. OP2 decided to stop when light was yellow.
46	08/14/15	Friday	4:21 PM	Angle	Daylight	Clear	Dry	Unknown	Unknown	No Injury	80				Eastbound MV2 struck MV1 who was making a westbound left turn

## Crash Data Summary Table

Route 134 at Patriot Square/Market Street, Dennis, MA  
2013 - 2017

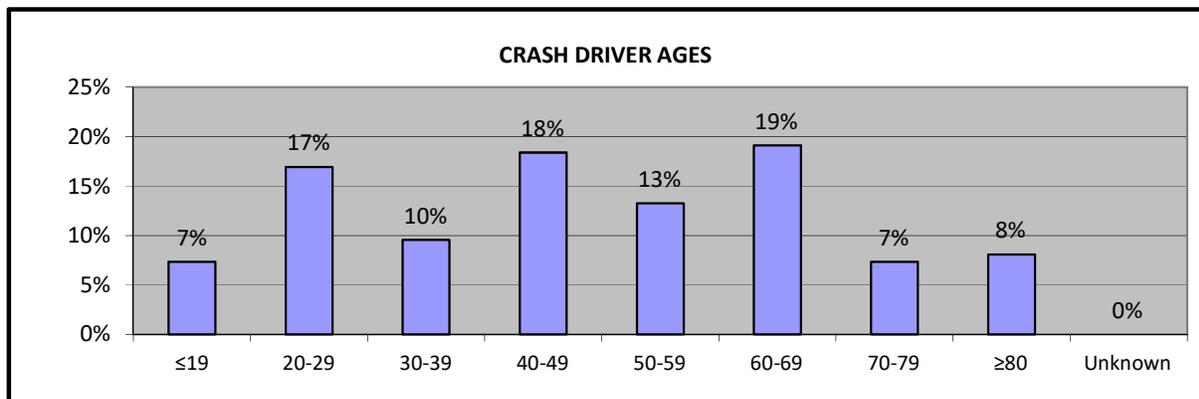
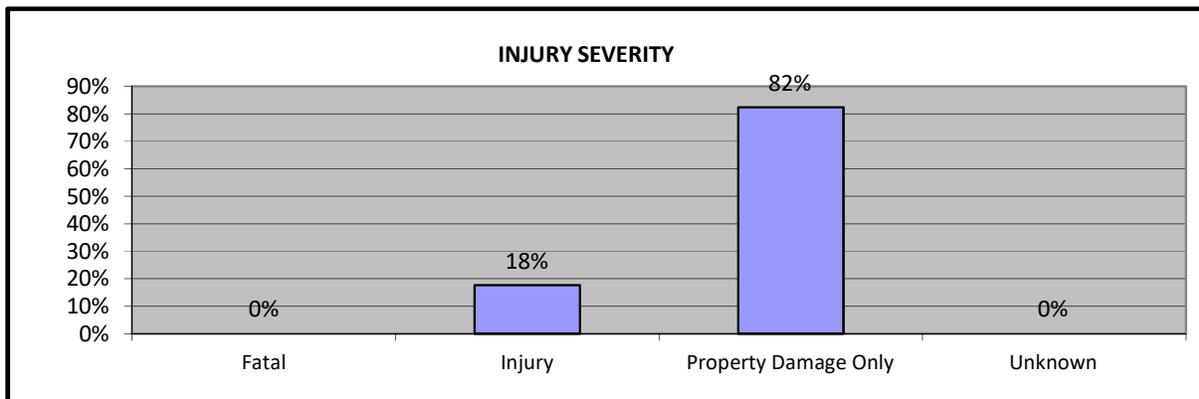
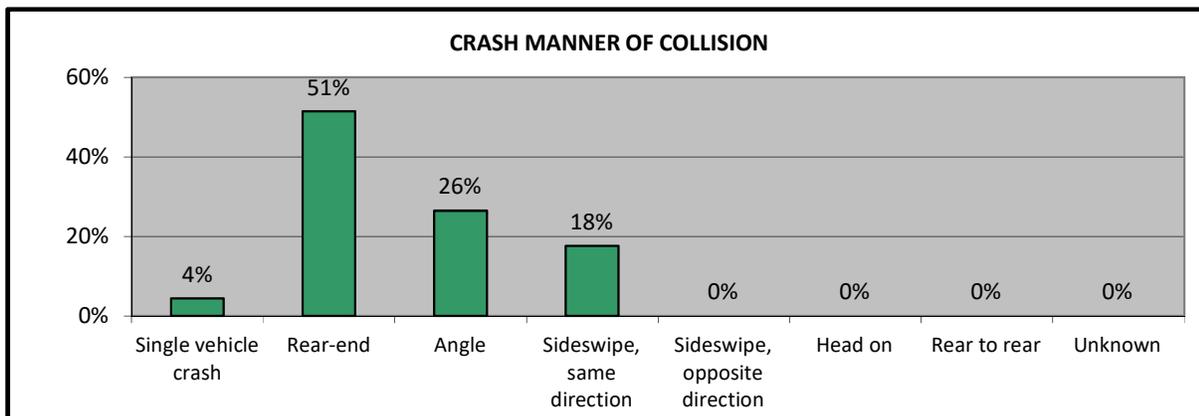
Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	Driver Distracted By	Injury Severity	D1 Age	D2 Age	D3 Age	D4 Age	Comments
#	mm/dd/yy	Day	hh:mm	Type	Type	Type	Type	Type	Type	Type	#	#	#	#	
47	09/15/15	Tuesday	3:57 PM	Sideswipe, same direction	Daylight	Clear	Dry	Inattention	Unknown	No Injury	50	68			MV2 sideswiped MV1 while attempting to enter left turn lane
48	12/12/15	Saturday	7:24 PM	Sideswipe, same direction	Dark - lighted roadway	Clear	Dry	Unknown	Unknown	No Injury	85	89			MV2 and MV1 sideswiped while both attempting to make a left turn onto Market Place
49	12/24/15	Thursday	11:12 AM	Sideswipe, same direction	Daylight	Clear	Dry	Inattention	NA	No Injury	74	73			MV2 sideswiped MV1 while attempting to go around MV1 who was making a left turn into a parking lot
50	03/03/16	Thursday	12:47 PM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	Not distracted	Non-fatal injury	69	83			Southbound MV1 ran red light and struck MV2 who was traveling eastbound
51	04/05/16	Tuesday	6:08 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	Not distracted	No Injury	17	77			MV2 failed to stop in time for red light and rear-ended MV1. OP2 stated that did not see red light.
52	04/14/16	Thursday	10:19 AM	Rear-end	Daylight	Clear	Dry	Inattention	Not distracted	No Injury	65	53			MV2 rear-ended MV1 thinking they had merged into traffic
53	05/01/16	Sunday	7:09 PM	Single vehicle crash	Dusk	Rain	Wet	Made an improper turn	NA	No Injury	17				MV1 struck a curb while making a right turn into Patriots Square
54	05/10/16	Tuesday	7:05 AM	Rear-end	Daylight	Clear	Dry	Followed too closely	NA	No Injury	28	63			MV1 rear-ended MV2 who stopped suddenly due to glare
55	06/20/16	Monday	6:56 PM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	Non-fatal injury	31	47			MV1 accelerated and rear-ended MV2 once red light turned green
56	06/25/16	Saturday	10:38 AM	Angle	Daylight	Clear	Dry	Inattention	NA	No Injury					MV1 was exiting Patriots Square via a right turn and struck a bicyclist who was traveling southbound in the northbound lanes
57	07/24/16	Sunday	3:54 PM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	No Injury	67	70			MV2 rear-ended MV1 while stopped at the intersection
58	09/03/16	Saturday	8:27 AM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	No Injury	32	40			MV1 failed to stop for traffic and rear-ended MV2
59	09/17/16	Saturday	12:28 PM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	No Injury	60	22			MV1 rear-ended MV2 approaching the intersection
60	09/24/16	Saturday	6:39 PM	Rear-end	Dusk	Clear	Dry	Inattention	Unknown	Non-fatal injury	21	45			MV1 rear-ended MV2 while waiting to merge into Route 134 traffic
61	09/26/16	Monday	6:55 PM	Rear-end	Dark - lighted roadway	Clear	Dry	Followed too closely	Not distracted	No Injury	59	60			MV2 rear-ended MV1 after their foot slipped off the brake
62	10/16/16	Sunday	12:52 PM	Rear-end	Daylight	Clear	Dry	Inattention	Not distracted	No Injury	53	68			MV2 accelerated and rear-ended MV1 once red light turned green
63	05/04/17	Thursday	4:16 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	Not distracted	No Injury	24	31			Northbound MV2 ran the left turn arrow red light and struck MV1 who was traveling southbound and had the right of way
64	05/28/17	Sunday	10:36 AM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	No Injury	18	95	27		MV1 failed to stop for traffic and caused a three-car rear-end collision
65	06/15/17	Thursday	10:20 AM	Sideswipe, same direction	Daylight	Clear	Dry	Inattention	NA	No Injury	67	47			MV1 sideswiped MV2 while attempting to change lanes and did not see MV2
66	06/22/17	Thursday	9:13 AM	Rear-end	Daylight	Clear	Dry	Inattention	Not distracted	No Injury	52	45			MV2 failed to stop for traffic and rear-ended MV1
67	08/08/17	Tuesday	2:42 PM	Rear-end	Daylight	Clear	Dry	Inattention	Passenger	No Injury	30	40	64	67	MV1 failed to stop for red light and caused a four-car rear-end collision. OP1 was changing radio station.
68	11/11/17	Saturday	5:05 PM	Sideswipe, same direction	Dark - lighted roadway	Clear	Dry	No improper driving	NA	Non-fatal injury	26	46	87		MV2 sideswiped MV1 while trying to avoid MV3 who was entering Route 134 from Patriots Square via a right turn

\*Courtesy Crash - A term used to describe a crash that occurs subsequent to a non-involved mainline driver who gives the right of way, contrary to the rules of the road, to another driver.

Summaries based on crash reports obtained from the Town of Dennis Police Department/MassDOT records.

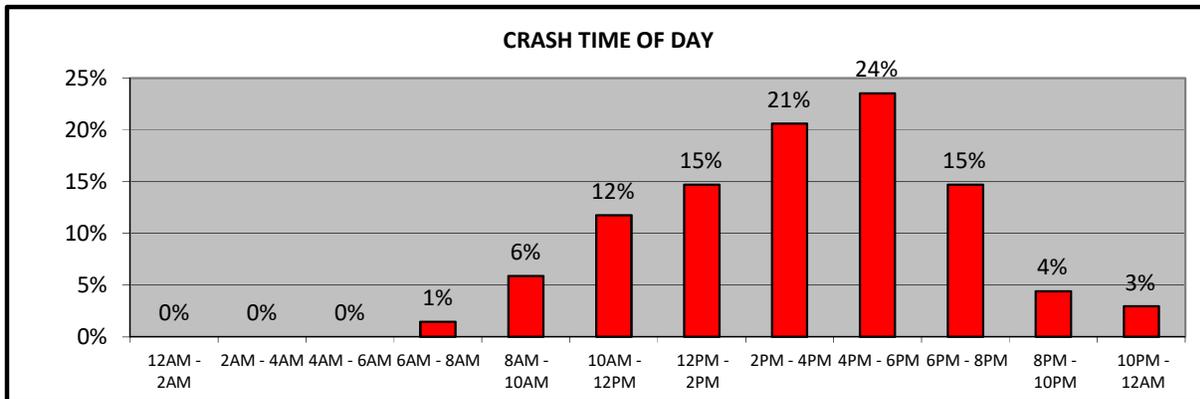
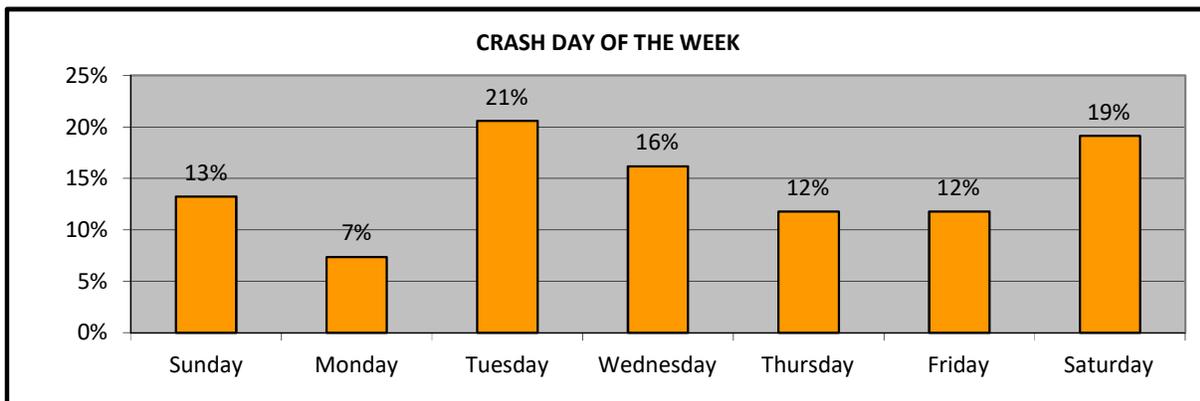
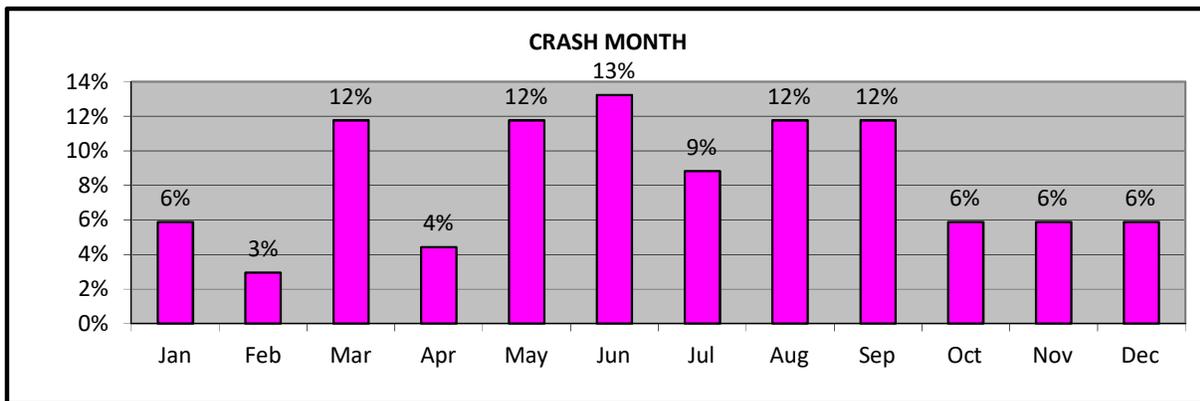
## Crash Data Summary Charts

### Route 134 at Patriot Square/Market Street, Dennis, MA



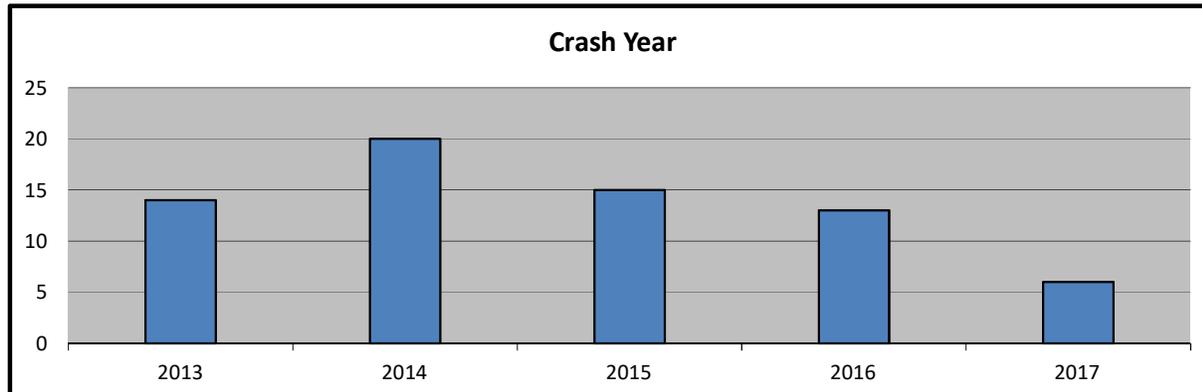
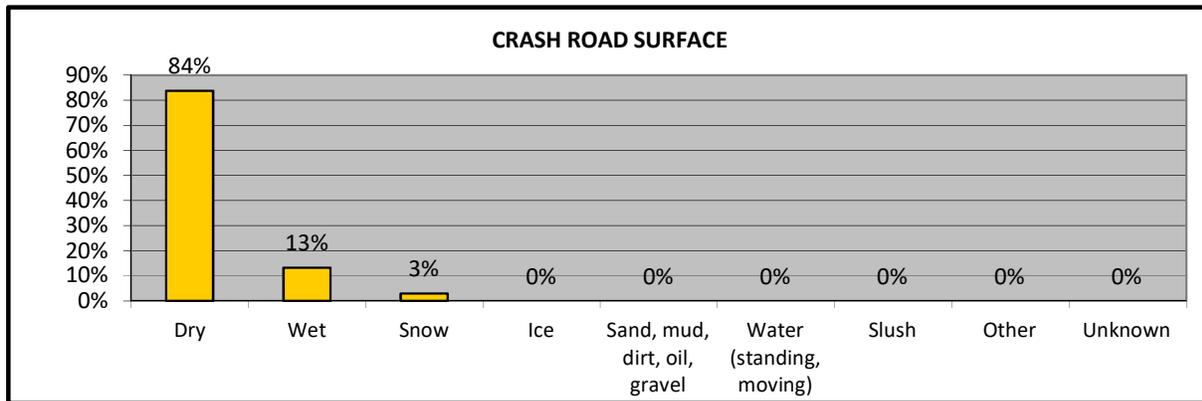
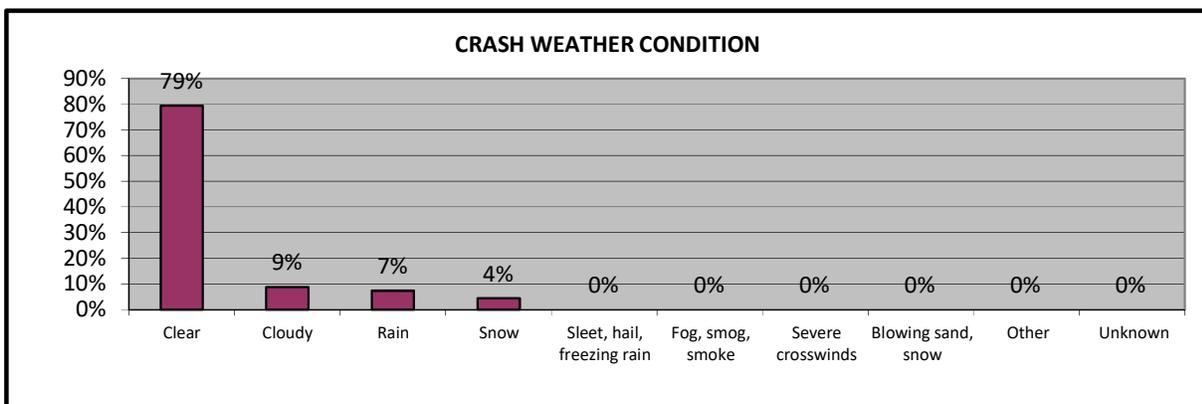
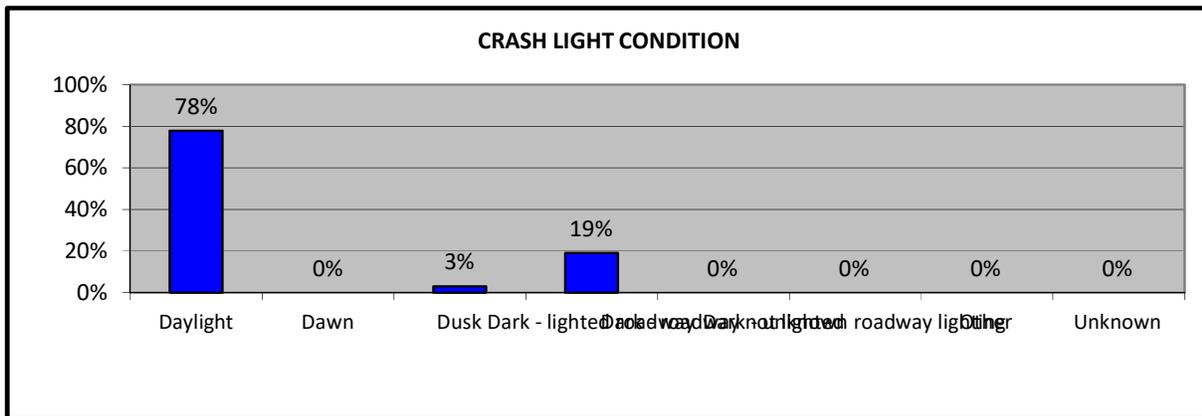
## Crash Data Summary Charts

### Route 134 at Patriot Square/Market Street, Dennis, MA

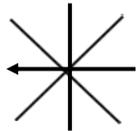


## Crash Data Summary Charts

### Route 134 at Patriot Square/Market Street, Dennis, MA



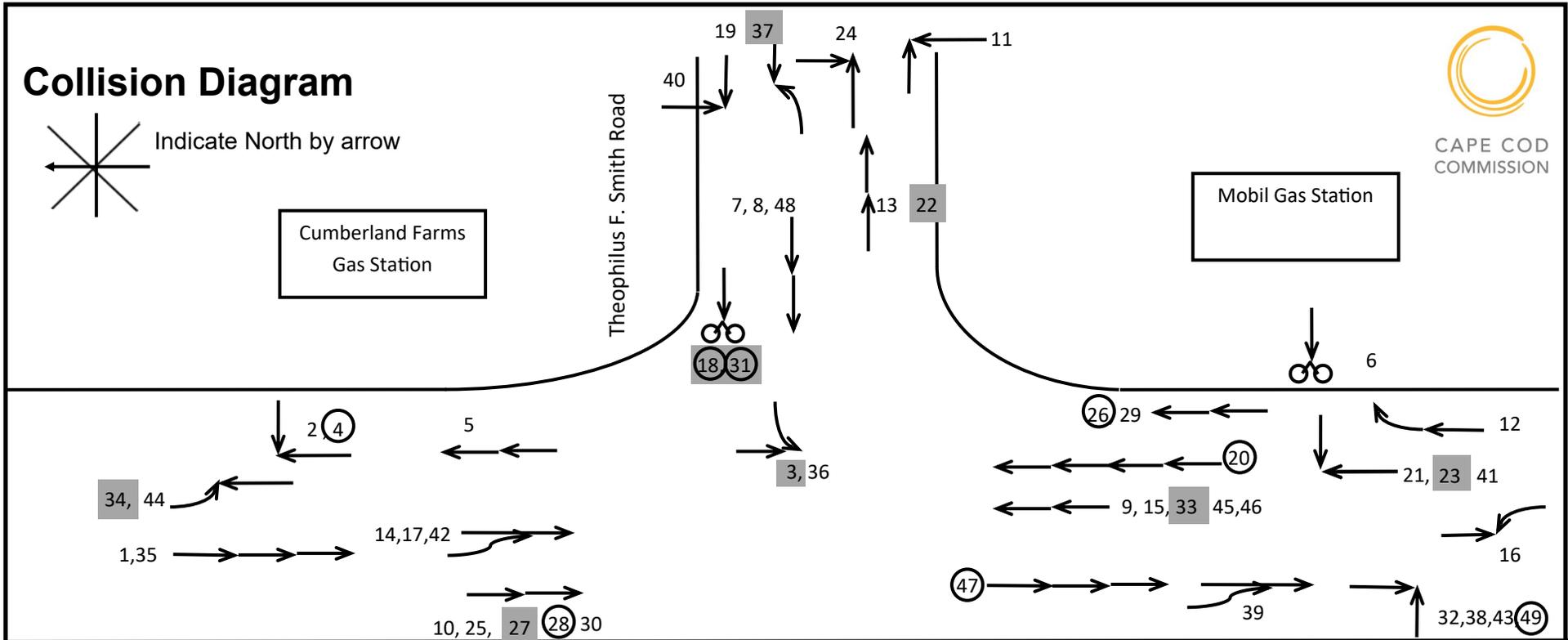
# Collision Diagram



Indicate North by arrow



CAPE COD COMMISSION



Route 134

Mid-Cape Home Centers

SYMBOLS	TYPES OF COLLISIONS	CRASH INFORMATION:	Notes:
<ul style="list-style-type: none"> <li> Moving Vehicle</li> <li> Backing Vehicle</li> <li> Non-involved Vehicle</li> <li> Pedestrian</li> <li> Bicyclist</li> <li> Fixed Object</li> <li> Fatal Crash</li> <li> Injury Crash</li> <li> Night Time Crash</li> </ul>	<ul style="list-style-type: none"> <li> Rear-End</li> <li> Head On</li> <li> Side Swipe</li> <li> Out of Control</li> <li> Turning Movement</li> <li> Right Angle</li> </ul>	<p>Each crash is labeled with a Crash# and additional information is included on the crash summary.</p>	<p>Total Crashes: 49                  Injury Crashes: 8                  Fatality Crashes: 0</p>
		<p><b>INTERSECTION:</b>                  Route 134 AND Theophilus F. Smith Road, Dennis, MA</p> <p><b>CRASHES FROM 2013 TO 2017</b></p> <p>Analysis prepared: 5/13/20</p>	

**Crash Data Summary Table**  
Route 134 at Theophilus F. Smith Road, Dennis, MA  
2013 - 2017

Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	Driver Distracted By	Injury Severity	D1 Age	D2 Age	D3 Age	D4 Age	Comments
#	mm/dd/yy	Day	hh:mm	Type	Type	Type	Type	Type	Type	Type	#	#	#	#	
1	03/07/13	Thursday	3:39 PM	Rear-end	Daylight	Rain	Wet	Driving too fast for conditions	NA	No Injury	22	34	82		MV1 rear-ended MV3 which then rear-ended MV2, who were both stopped at a red light. OP1 stated that he skidded on wet pavement.
2	05/14/13	Tuesday	7:57 AM	Angle	Daylight	Rain	Wet	Failed to yield right of way	Unknown	No Injury	30	49			Courtesy Crash. MV2 struck MV1 while making a left turn out of Cumberland Farms.
3	06/18/13	Tuesday	7:27 PM	Angle	Dusk	Cloudy	Dry	Disregarded traffic signs, signals, road markings	NA	No Injury	61	46			MV2 ran a red light and collided with MV1 who was making a left turn from Theophilus Smith Road and had a green light.
4	07/03/13	Wednesday	11:14 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	NA	Non-fatal injury	47	16			MV2 struck MV1 while making a left turn out of Cumberland Farms. MV1 had turned right from Theophilus Smith Road.
5	07/29/13	Monday	1:59 PM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	No Injury	71	48			MV1 rear-ended MV2 who stopped suddenly as she was cut off.
6	08/08/13	Thursday	5:10 PM	Single vehicle crash	Daylight	Clear	Dry	Unknown	Unknown	No Injury					MV1 was attempting to exit Mobil Gas and struck a bicyclist who was traveling south on the sidewalk.
7	08/15/13	Thursday	4:24 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	NA	No Injury	66	30			MV2 rear-ended MV1 who made a sudden stop due to a bicyclist entering the intersection in front of MV1. The bicyclist disregarded the pedestrian signal indication as MV1 had the right-of-way with a green signal.
8	02/04/14	Tuesday	6:34 PM	Rear-end	Dark - lighted roadway	Clear	Wet	Driving too fast for conditions	NA	No Injury	64	19			MV2 slid on a wet roadway and rear-ended MV1.
9	04/08/14	Tuesday	5:10 PM	Rear-end	Daylight	Cloudy	Dry	Followed too closely	NA	No Injury	87	23			MV2 rear-ended MV1 while stopped at red light.
10	04/11/14	Friday	7:04 AM	Rear-end	Daylight	Clear	Dry	Inattention	NA	No Injury	49	62			MV2 rear-ended MV1 while turning left onto Theophilus Smith Road and stated he was not paying attention.
11	04/24/14	Thursday	7:03 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	NA	No Injury	35	34			MV2 was attempting to make a left turn out of Rogers & Gray and pulled out too far colliding with MV1.
12	05/21/14	Wednesday	11:12 AM	Rear-end	Daylight	Clear	Dry	Unknown	Unknown	No Injury	18	61			MV1 rear-ended MV2 while slowing in traffic to make a right turn into Mobil Gas. MV1 operator stated he looked down briefly and did not realize MV2 was slowing.
13	05/24/14	Saturday	3:12 PM	Rear-end	Daylight	Clear	Dry	Inattention	NA	No Injury	79	45			MV2 rear-ended MV1 while stopped in traffic.
14	07/03/14	Thursday	12:29 PM	Sideswipe, same direction	Daylight	Clear	Dry	Failed to yield right of way	Unknown	No Injury	35	24			MV1 sideswiped MV2 while trying to enter left turn lane.
15	07/13/14	Sunday	10:06 AM	Rear-end	Daylight	Clear	Dry	Inattention	NA	No Injury	34	60			MV1 rear-ended MV2 while stopped in traffic.
16	07/20/14	Sunday	12:50 PM	Angle	Daylight	Cloudy	Dry	Inattention	Unknown	No Injury	92	50			MV1 struck MV2 while making a left turn into Mid-Cape Home Center.
17	07/24/14	Thursday	1:21 PM	Sideswipe, same direction	Daylight	Clear	Dry	Inattention	NA	No Injury	69	53			MV2 sideswiped MV1 while entering left turn lane. MV1 was waiting to make a left turn into Cumberland Farms.
18	08/09/14	Saturday	10:20 AM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	NA	Non-fatal injury	66	18			MV1 struck bicyclist who was traveling southbound in the northbound lanes. Visibility of MV1 was obstructed by adjacent vehicle in the right turn lane. The bicyclist disregarded the pedestrian signal indication as MV1 had the right-of-way with a green signal.
19	08/09/14	Saturday	2:31 PM	Angle	Daylight	Clear	Dry	Made an improper turn	NA	No Injury	61	63			MV2 struck MV1 while making a left turn into Cumberland Farms.
20	10/05/14	Sunday	3:44 PM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	Non-fatal injury	59	58	73	54	MV4 rear-ended MV3 who then rear-ended MV2 who then rear-ended MV1. MV4 was traveling at a high rate of speed.
21	10/27/14	Monday	4:11 PM	Angle	Daylight	Clear	Dry	Inattention	NA	No Injury	71	50			Courtesy Crash. MV2 struck MV1 while making a left turn out of Mobil Gas. MV3 slowed in the outside lane to allow MV1 to exit. MV2 was traveling in the inside lane.
22	11/21/14	Friday	5:14 PM	Rear-end	Dark - lighted roadway	Clear	Dry	Distracted	Other activity (searching, eating, personal hygiene, etc.)	No Injury	23	64			MV2 rear-ended MV1 as he was searching for his dropped cell phone.
23	02/19/15	Thursday	6:18 PM	Angle	Dark - lighted roadway	Cloudy	Dry	Visibility obstructed	Unknown	No Injury	42	72			Courtesy Crash. MV2 was struck by MV1 while making a left turn out of Mobil Gas. MV3 slowed in the inside lane to allow MV2 to exit. MV1 was traveling in the outside lane.
24	03/03/15	Tuesday	7:04 AM	Angle	Daylight	Clear	Dry	Inattention	NA	No Injury	72	28			MV1 struck MV2 while making a left turn out of Cumberland Farms.
25	03/05/15	Thursday	7:13 AM	Rear-end	Daylight	Snow	Snow	Followed too closely	NA	No Injury	69	20			MV2 rear-ended MV1 while sliding on ice.
26	07/16/15	Thursday	10:55 AM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	Non-fatal injury	73	34			MV2 rear-ended MV1 while exiting Mobil Gas.
27	07/20/15	Monday	8:14 PM	Rear-end	Dusk	Clear	Dry	Inattention	NA	No Injury	34	59			MV1 rear-ended MV2 as their foot slipped off the brake.
28	07/20/15	Monday	9:10 PM	Rear-end	Daylight	Clear	Dry	Inattention	NA	Non-fatal injury	17	31			MV1 rear-ended MV2 while slowing in traffic.
29	08/04/15	Tuesday	11:29 AM	Rear-end	Daylight	Clear	Dry	Failed to yield right of way	Unknown	No Injury	81	28			MV2 rear-ended MV1 while exiting Mobil Gas.
30	08/04/15	Tuesday	5:00 PM	Rear-end	Daylight	Clear	Dry	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc.	NA	No Injury	31	35			MV1 rear-ended MV2 while trying to maneuver around MV2 who was refusing to move.
31	08/08/15	Saturday	8:21 PM	Angle	Dark - lighted roadway	Clear	Dry	Inattention	Other activity (searching, eating, personal hygiene, etc.)	Non-fatal injury	67	21			MV1 struck bicyclist in crosswalk while making a right turn.
32	08/13/15	Thursday	10:17 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	Unknown	No Injury	61	41			MV1 struck MV2 while exiting from Mid-Cape Home Center. MV1 stated he hit the gas instead of the brake.
33	08/15/15	Saturday	11:02 PM	Rear-end	Dark - lighted roadway	Clear	Dry	Physical impairment	Unknown	No Injury	21	44			MV1 rear-ended MV2 while stopped at red light.
34	08/27/15	Thursday	10:07 PM	Angle	Dark - lighted roadway	Clear	Dry	Inattention	Unknown	No Injury	19	51			MV2 was struck by MV1 while making a left turn into Cumberland Farms.
35	09/18/15	Friday	3:40 PM	Rear-end	Daylight	Clear	Dry	Fatigued/asleep	NA	No Injury	66	67	70		MV2 rear-ended MV1 and then MV2 also struck MV3. OP2 stated he was very tired.
36	10/11/15	Sunday	12:15 PM	Sideswipe, same direction	Daylight	Clear	Dry	Inattention	Unknown	No Injury	63	51			MV1 ran red light and struck MV2 who had right-of-way.
37	12/07/15	Monday	5:57 PM	Angle	Dark - lighted roadway	Clear	Dry	Failed to yield right of way	Unknown	No Injury	32	39			MV2 was struck by MV1 while making a left turn into Cumberland Farms.
38	12/15/15	Tuesday	9:06 AM	Angle	Daylight	Clear	Wet	Inattention	Unknown	No Injury	65	31			MV1 struck MV2 while exiting from Mid-Cape Home Center.
39	02/14/16	Sunday	2:09 PM	Sideswipe, same direction	Daylight	Clear	Wet	Other improper action	NA	No Injury	43	66			MV2 sideswiped MV1 while changing lanes.
40	06/18/16	Saturday	8:32 AM	Angle	Daylight	Clear	Dry	Inattention	NA	No Injury	45	19			MV1 struck MV2 while making a right turn out of Cumberland Farms.
41	07/05/16	Tuesday	4:38 PM	Angle	Daylight	Clear	Dry	Failure to keep in proper lane or running off road	NA	No Injury	37	63			While exiting Mobil Gas via a right turn, MV1 struck MV2.
42	07/14/16	Thursday	3:04 PM	Sideswipe, same direction	Daylight	Cloudy	Dry	Made an improper turn	NA	No Injury	52	37			MV1 attempted to change lanes to enter left turn lane and struck MV2.
43	07/15/16	Friday	4:10 PM	Angle	Daylight	Cloudy	Dry	Failed to yield right of way	Unknown	No Injury	30	56			Courtesy Crash. MV3 slowed to allow MV2 make a left turn from Mid-Cape Home driveway. MV2 struck MV1 who was traveling in the inside lane.

## Crash Data Summary Table

Route 134 at Theophilus F. Smith Road, Dennis, MA  
2013 - 2017

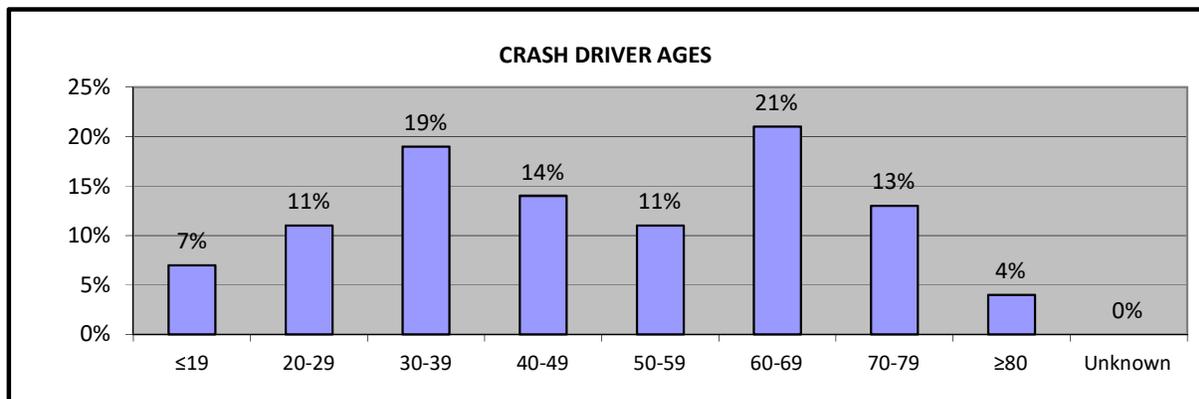
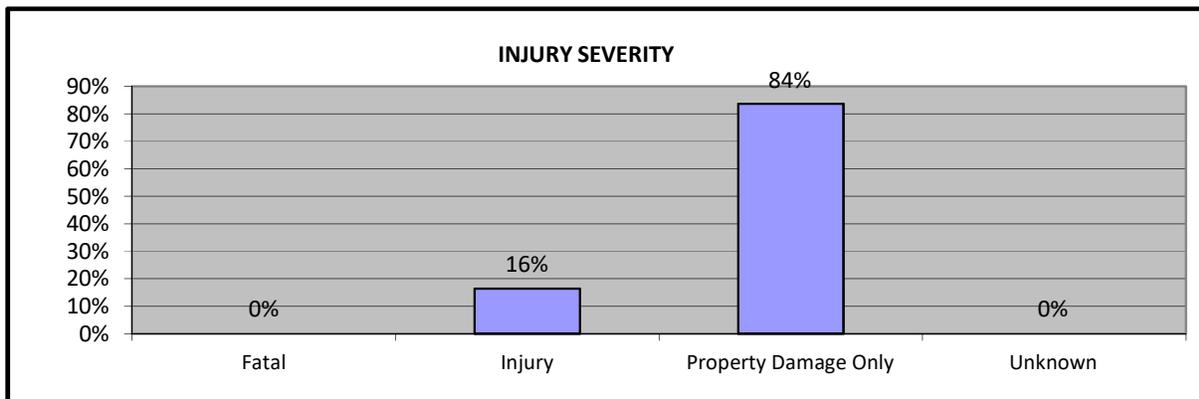
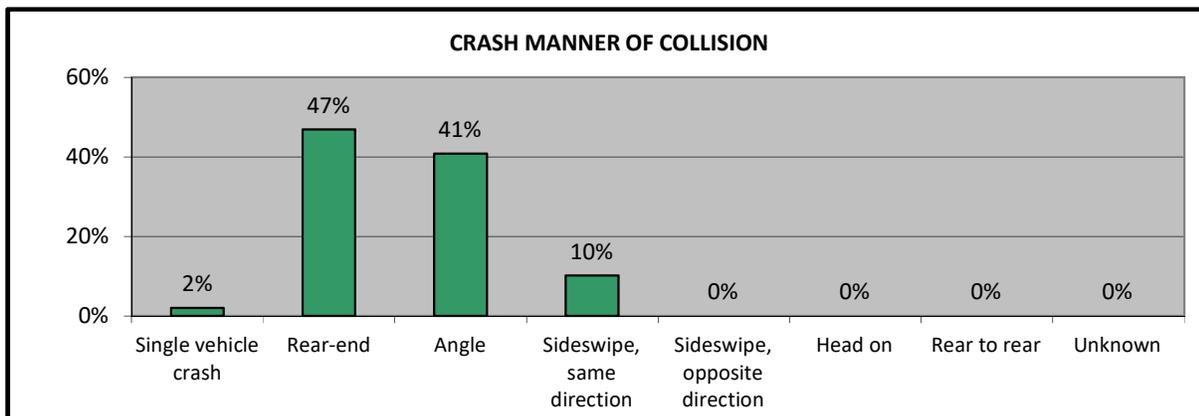
Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	Driver Distracted By	Injury Severity	D1 Age	D2 Age	D3 Age	D4 Age	Comments
#	mm/dd/yy	Day	hh:mm	Type	Type	Type	Type	Type	Type	Type	#	#	#	#	
44	04/12/17	Wednesday	12:12 PM	Angle	Daylight	Clear	Dry	No improper driving	Unknown	No Injury	76				MV2 struck MV1 while making a left turn into Cumberland Farms.
45	05/30/17	Tuesday	10:02 AM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	No Injury	49	79			MV1 rear-ended MV2 who was stopped in traffic after exiting Mid-Cape Home.
46	06/24/17	Saturday	1:48 PM	Rear-end	Daylight	Clear	Dry	Inattention	NA	No Injury	43	41			MV2 rear-ended MV1 who was stopped at the red light.
47	09/09/17	Saturday	3:25 PM	Rear-end	Daylight	Clear	Dry	Inattention	NA	Non-fatal injury	78	74	32		MV1 rear-ended MV2 who then rear-ended MV3 who was slowing in traffic to make a left turn.
48	09/30/17	Saturday	10:58 AM	Rear-end	Daylight	Cloudy	Dry	Inattention	NA	No Injury	25	70			MV2 rear-ended MV1 who was stopped at the red light.
49	10/23/17	Monday	2:39 PM	Angle	Daylight	Clear	Dry	Inattention	Unknown	Non-fatal injury	24	61			MV2 struck MV1 while making a left turn from Mid-Cape Home Center.

\*Courtesy Crash - A term used to describe a crash that occurs subsequent to a non-involved mainline driver who gives the right of way, contrary to the rules of the road, to another driver.

Summaries based on crash reports obtained from the Town of Dennis Police Department/MassDOT Records.

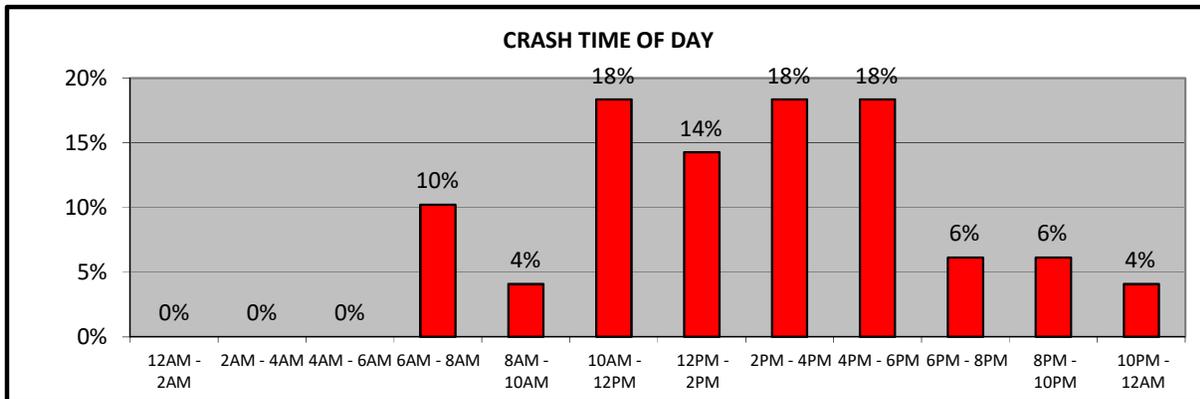
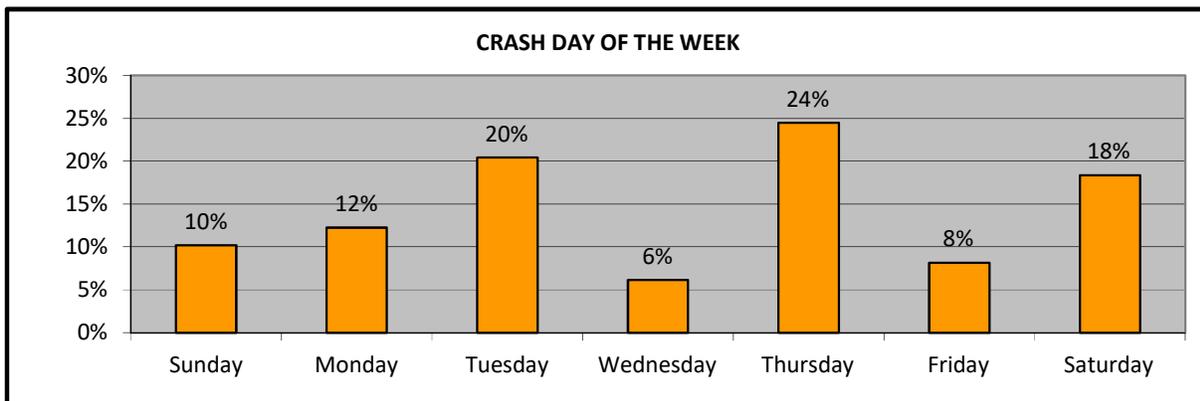
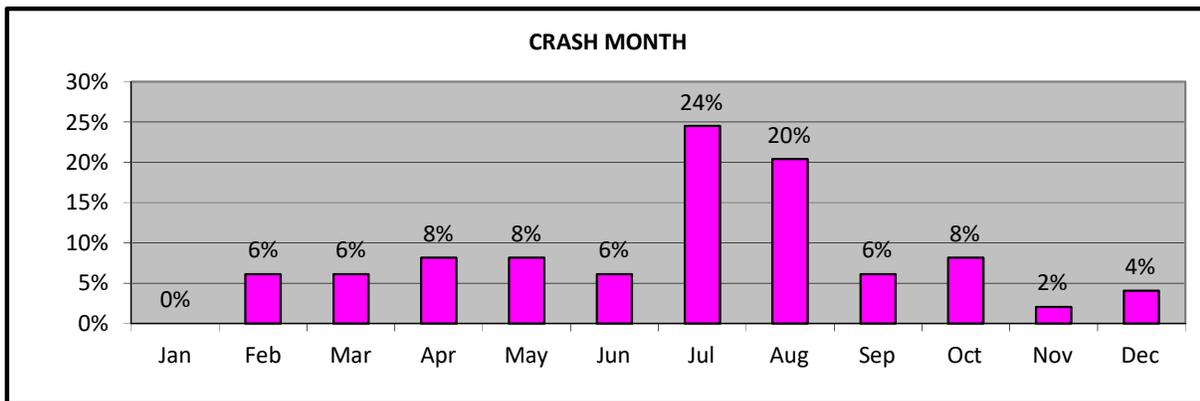
## Crash Data Summary Charts

### Route 134 at Theophilus F. Smith Road, Dennis, MA



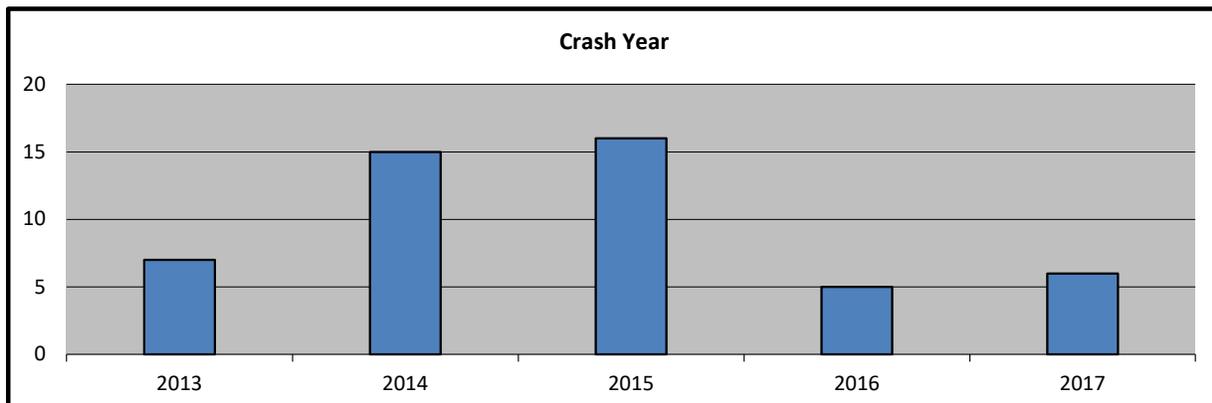
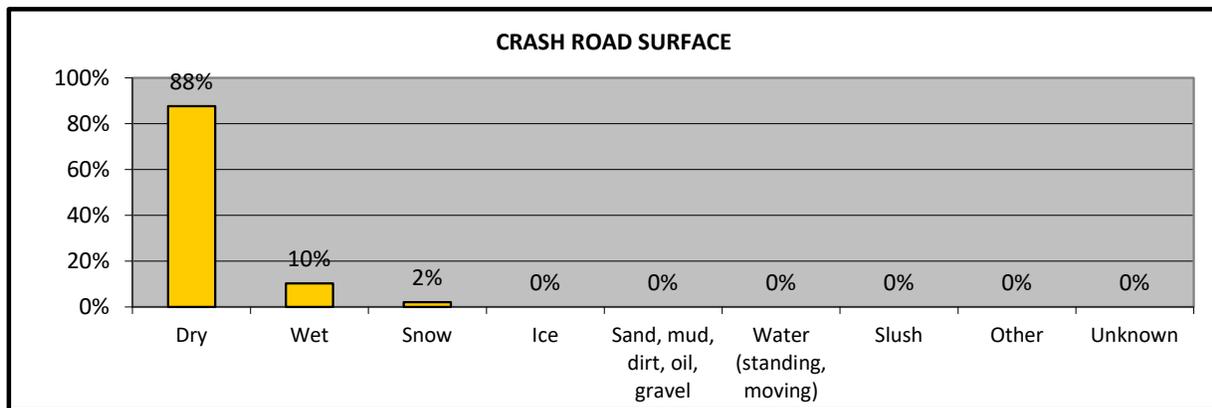
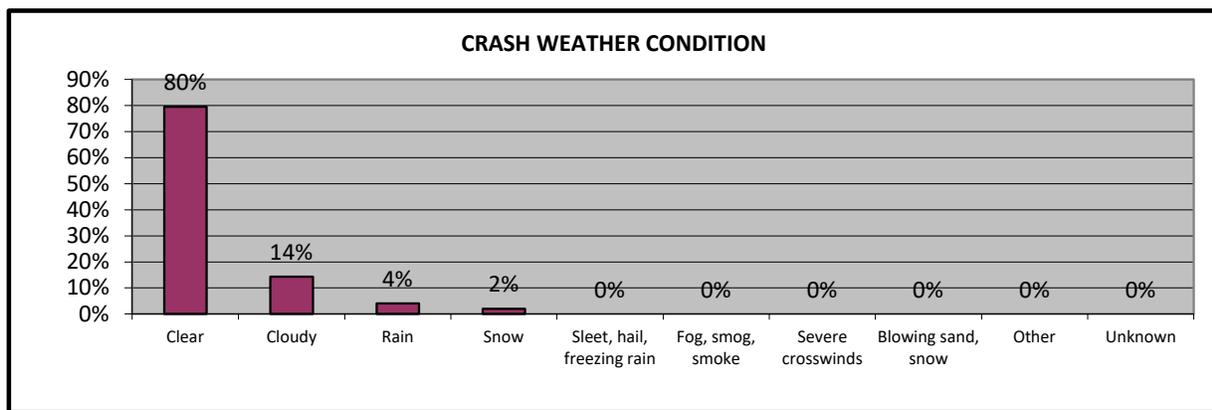
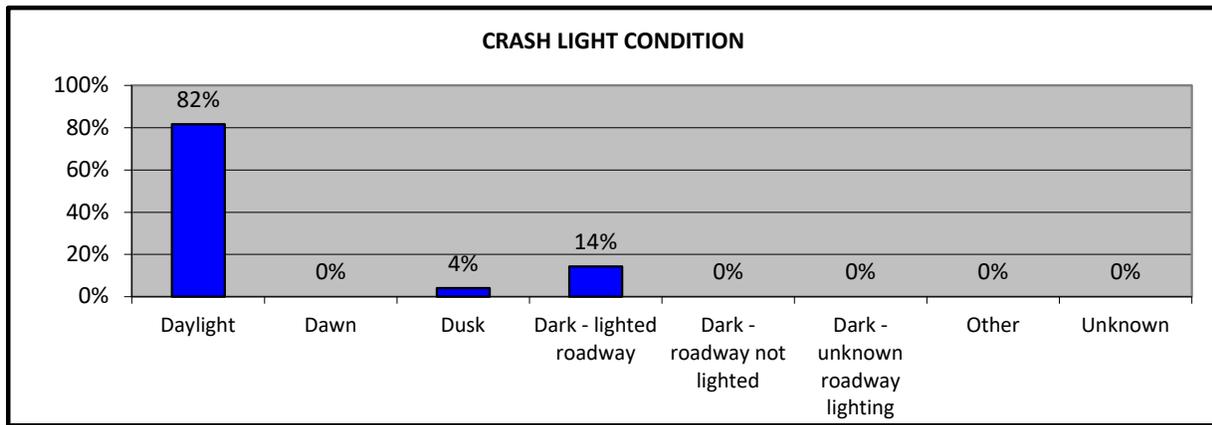
## Crash Data Summary Charts

### Route 134 at Theophilus F. Smith Road, Dennis, MA

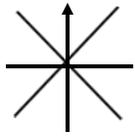


## Crash Data Summary Charts

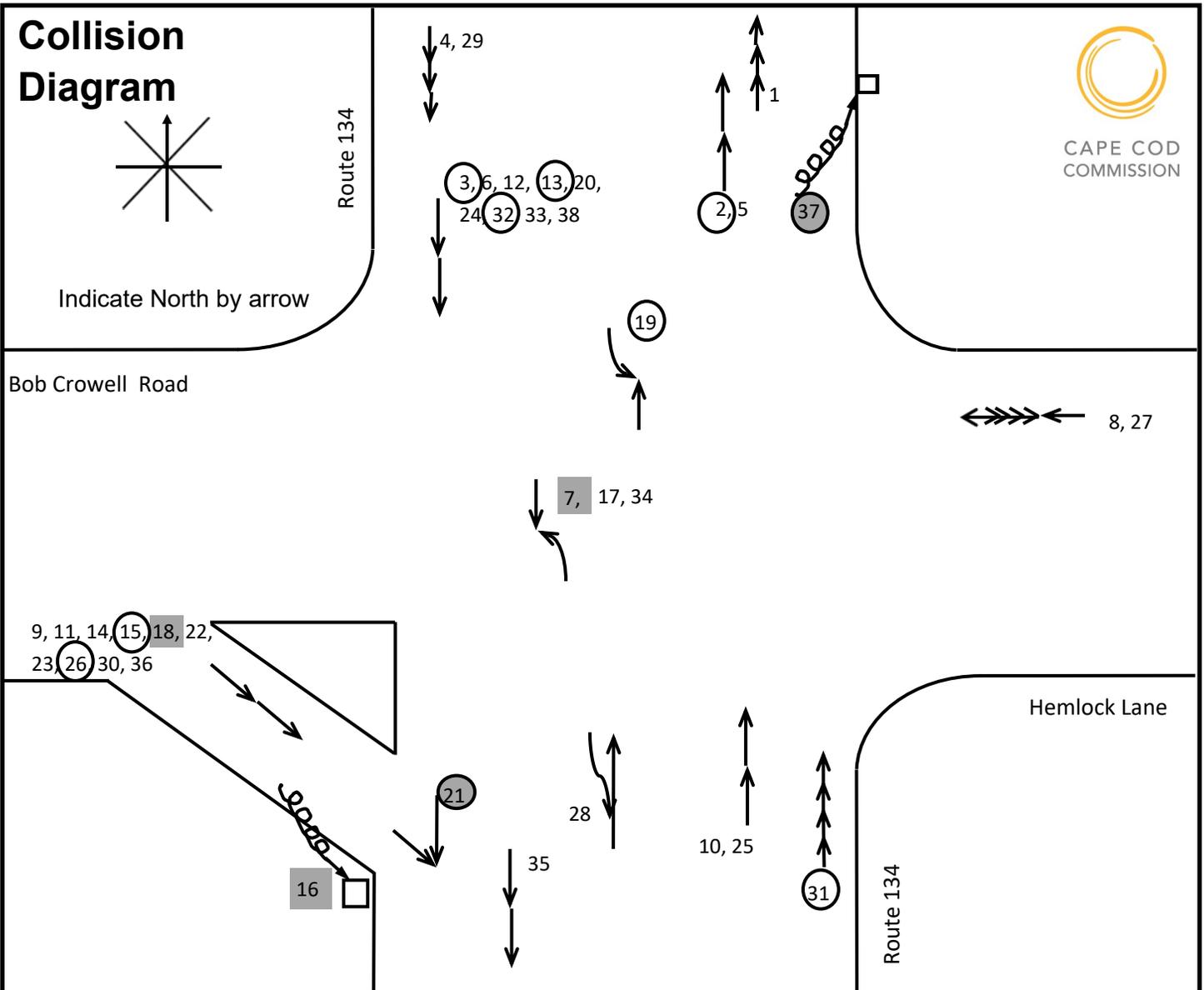
### Route 134 at Theophilus F. Smith Road, Dennis, MA



# Collision Diagram



Indicate North by arrow



SYMBOLS		TYPES OF COLLISIONS		CRASH INFORMATION
	Moving Vehicle		Rear-End	Each crash is labeled with a Crash# and additional information is included on the crash summary.
	Backing Vehicle		Head On	
	Non-involved Vehicle		Sideswipe (same)	<b>Notes:</b> Total Crashes: 38 Injury Crashes: 10 Fatality Crashes: 0
	Pedestrian		Sideswipe (opposite)	
	Bicyclist		Out of Control	
	Parked Vehicle		Turning Movement	
	Fixed Object		Right Angle	
	Fatal Crash			
	Injury Crash			
	Night Time Crash			

INTERSECTION: Route 134 And Bob Crowell Road, Dennis, MA

CRASHES FROM 2013 TO 2017

Analysis prepared: 5/13/20

**Crash Data Summary Table**  
Route 134 at Bob Crowell Road, Dennis, MA  
2013 - 2017

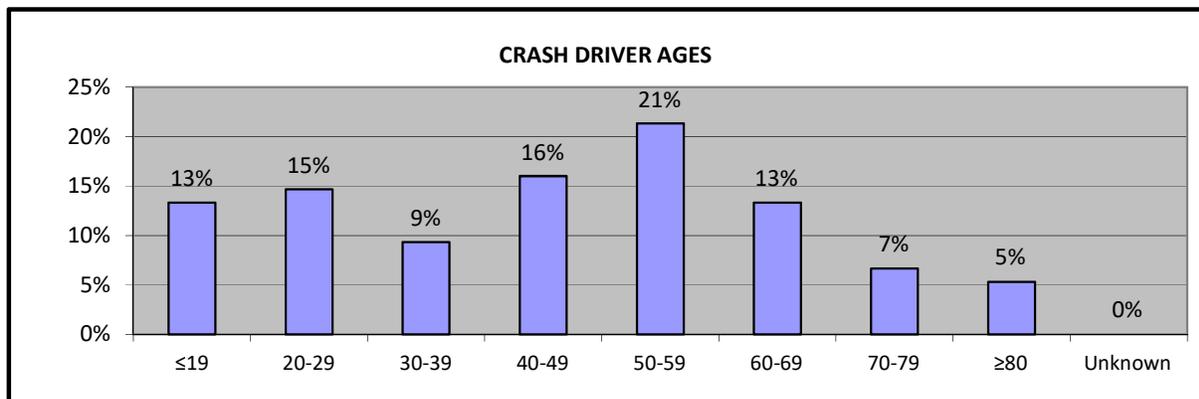
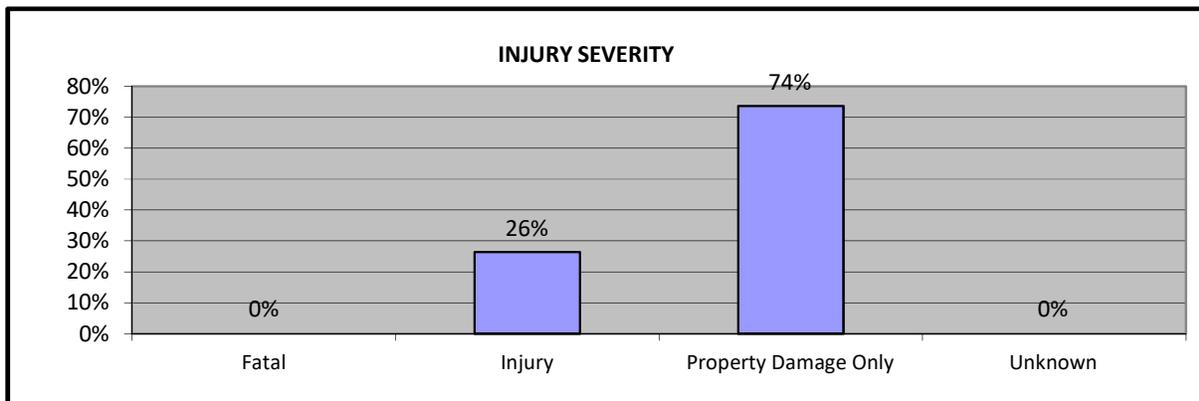
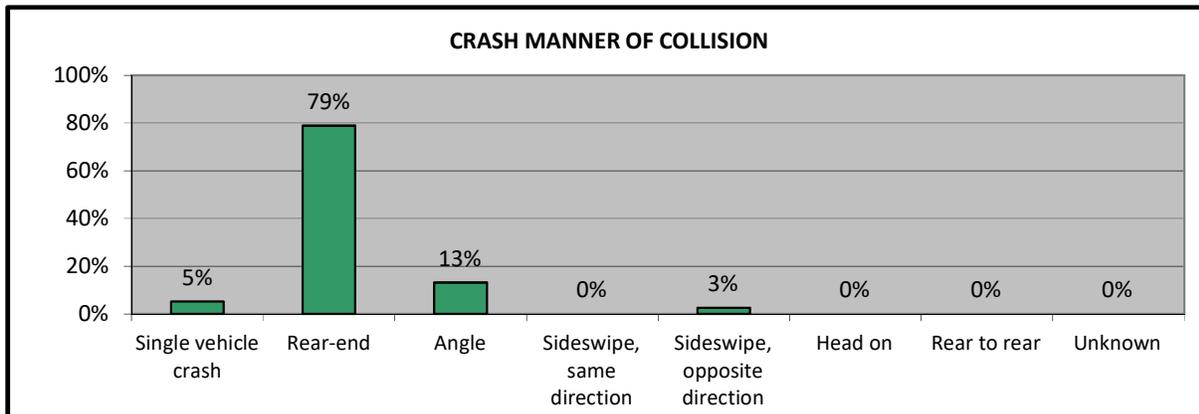
Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	Driver Distracted By	Injury Severity	D1 Age	D2 Age	D3 Age	D4 Age	Comments
#	mm/dd/yy	Day	hh:mm	Type	Type	Type	Type	Type	Type	Type	#	#	#	#	
1	02/11/13	Monday	9:28 AM	Rear-end	Daylight	Rain	Wet	Unknown	Unknown	No Injury	51	43			MV1 rear-ended MV2 who then rear-ended MV3 who were stopped in traffic waiting to make a left turn into the old Town Hall driveway. OP1 stated that skidded in wet pavement.
2	03/15/13	Friday	2:54 PM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	Non-fatal injury	55	34			MV2 rear-ended MV1 who was slowing down to turn right into Agway
3	04/09/13	Tuesday	3:35 PM	Rear-end	Daylight	Clear	Dry	Other improper action	NA	Non-fatal injury	52	47			MV1 rear-ended MV2 who was stopped in traffic. Operator of MV1 stated she was distracted by her cell phone
4	06/22/13	Saturday	10:04 AM	Rear-end	Daylight	Clear	Dry	Inattention	NA	No Injury	19	18			MV1 rear-ended MV2 who then rear-ended MV3 who were stopped in traffic. OP1 indicated that he wasn't paying attention.
5	09/23/13	Monday	3:36 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	Unknown	No Injury	52	62			MV2 rear-ended MV1 who was slowing down to turn right into Agway. OP2 stated that can of soda rolled under brake pedal.
6	11/07/13	Thursday	12:29 PM	Rear-end	Daylight	Rain	Wet	Unknown	Unknown	No Injury	34	27			MV2 rear-ended MV1 who was slowing down in traffic stopped at red light.
7	12/15/13	Sunday	10:31 PM	Angle	Dark - lighted roadway	Clear	Dry	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner	NA	No Injury	39	43			MV1 was stopped for a red light in the southbound direction and was struck by MV2 who was traveling northbound
8	01/04/14	Saturday	1:22 PM	Rear-end	Daylight	Clear	Wet	No improper driving	NA	No Injury	44	46			MV2 was plowing the intersection and backed into MV1 who was trying to maneuver around the plow.
9	03/03/14	Monday	3:35 PM	Rear-end	Daylight	Cloudy	Wet	Inattention	NA	No Injury	23	25			MV2 rear-ended MV1 thinking MV1 had entered Route 134 traffic
10	03/27/14	Thursday	3:39 PM	Rear-end	Daylight	Clear	Wet	Inattention	NA	No Injury	50	17			MV2 rear-ended MV1 while in slow moving traffic
11	06/20/14	Friday	4:01 PM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	No Injury	28	58			MV1 took their foot off the brake and rear-ended MV2
12	07/02/14	Wednesday	1:49 PM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	No Injury	56	35			MV2 rear-ended MV1 while stopped in traffic
13	07/15/14	Tuesday	1:41 PM	Rear-end	Daylight	Clear	Dry	Inattention	NA	Non-fatal injury	77	85			MV1 rear-ended MV2 while stopped in traffic. OP1 stated she hit the gas instead of the brakes
14	07/24/14	Thursday	12:54 PM	Rear-end	Daylight	Cloudy	Dry	Failed to yield right of way	Not distracted	No Injury	68	27			MV2 rear-ended MV1 as MV1 appeared to be entering Route 134 traffic
15	07/27/14	Sunday	1:55 PM	Rear-end	Daylight	Rain	Wet	Followed too closely	Not distracted	Non-fatal injury	20	27			MV1 rear-ended MV2 who was stopped waiting for a gap in traffic
16	10/29/14	Wednesday	1:53 AM	Single vehicle crash	Dark - roadways not lighted	Cloudy	Wet	Driving too fast for conditions	Not distracted	No Injury	26				MV1 was accelerating into a right turn on wet pavement and slid out of control and hit a plastic conduit box
17	12/19/14	Friday	1:30 PM	Angle	Daylight	Cloudy	Dry	Inattention	Not distracted	No Injury	66	18			MV2 struck MV1 while making a left turn under permissive conditions (green ball) and did not yield to southbound through traffic. OP2 claimed she was just following the car in front of her.
18	01/05/15	Monday	5:48 PM	Rear-end	Dark - lighted roadway	Clear	Dry	Inattention	External distraction (outside the vehicle)	No Injury	60	65			MV2 rear-ended MV1 while slowing to yield for traffic
19	01/25/15	Sunday	12:38 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	Not distracted	Non-fatal injury	16	66			MV1 did not yield to oncoming traffic while making a left turn onto Hemlock Ln and was struck by MV2
20	03/20/15	Friday	1:30 PM	Rear-end	Daylight	Cloudy	Dry	Inattention	Not distracted	No Injury	51	55			MV2 failed to stop and rear-ended MV1 who was stopped at red light
21	07/16/15	Thursday	7:16 PM	Angle	Dusk	Clear	Dry	Inattention	Unknown	Non-fatal injury	76	52			After making a left turn onto Route 134 from Hemlock Ln, MV2 was struck by MV1 who was making a right turn under yield conditions from Bob Crowell Rd.
22	08/27/15	Thursday	1:25 PM	Rear-end	Daylight	Clear	Dry	Inattention	Not distracted	No Injury	56	56			MV2 rear-ended MV1 thinking MV1 had entered Route 134 traffic. OP2 stated looking at something inside vehicle.
23	08/29/15	Saturday	12:28 PM	Rear-end	Daylight	Clear	Dry	Inattention	Not distracted	No Injury	57	54			MV1 rear-ended MV2 who was stopped at the intersection. OP2 stated he could not see MV1 due to curvature of the roadway.
24	11/19/15	Thursday	1:45 PM	Rear-end	Daylight	Clear	Dry	Inattention	Not distracted	No Injury	61	71			MV2 rear-ended MV1 while stopped at traffic light. OP2 stated she accidentally took her foot off the brake.
25	07/26/16	Tuesday	4:18 PM	Rear-end	Daylight	Clear	Dry	Operating defective equipment	Not distracted	No Injury	72	37			MV2 rear-ended MV1 who was waiting to make a left turn. OP2 claimed to have bad brakes.
26	08/13/16	Saturday	7:50 AM	Rear-end	Daylight	Clear	Dry	Inattention	Not distracted	Non-fatal injury	17	45			MV2 rear-ended MV1 who was stopped waiting to enter traffic. OP2 was focusing on southbound traffic and did not see MV1
27	10/27/16	Thursday	12:54 PM	Rear-end	Daylight	Clear	Dry	Inattention	Not distracted	No Injury	64	19			MV1 backed up and collided with MV2 on Hemlock Ln. OP1 wanted to turn around but did not see MV2 arrive.
28	12/05/16	Monday	6:10 PM	Sideswipe, opposite direction	Daylight	Cloudy	Wet	Visibility obstructed	Not distracted	No Injury	89	18			MV1 crossed the double yellow line and sideswiped MV2 while making a right turn onto Route 134. OP2 claimed their windshield was fogged.
29	04/01/17	Saturday	12:07 PM	Rear-end	Daylight	Rain	Wet	Followed too closely	Not distracted	No Injury	17	42	49		MV1 slid on wet pavement and rear-ended MV2 who then rear-ended MV3 who were stopped at the red light
30	06/08/17	Thursday	6:04 PM	Rear-end	Daylight	Cloudy	Dry	Followed too closely	Not distracted	No Injury	31	17			MV1 rear-ended MV2 thinking MV2 had entered Route 134 traffic
31	06/24/17	Saturday	11:46 AM	Rear-end	Daylight	Rain	Wet	Followed too closely	NA	Non-fatal injury	49	25			MV2 rear-ended MV1 which caused MV3 to rear-end MV2 and MV4 to rear-end MV3
32	07/06/17	Thursday	11:14 AM	Rear-end	Daylight	Clear	Dry	Inattention	NA	Non-fatal injury	54	73			MV2 rear-ended MV1 who was stopped in traffic
33	08/02/17	Wednesday	8:06 AM	Rear-end	Daylight	Clear	Dry	Inattention	Not distracted	No Injury	21	63			MV2 rear-ended MV1 who was stopped in traffic
34	08/06/17	Sunday	6:48 AM	Angle	Daylight	Clear	Dry	Inattention	Unknown	No Injury	53	49			MV2 struck MV1 while making a left turn under permissive conditions (green ball) and did not yield to southbound through traffic.
35	08/27/17	Sunday	9:41 AM	Rear-end	Daylight	Clear	Dry	Inattention	NA	No Injury	68	25			MV2 rear-ended MV1 who was slowing down in traffic
36	09/11/17	Monday	8:07 AM	Rear-end	Daylight	Clear	Dry	Inattention	Not distracted	No Injury	47	84			MV2 rear-ended MV1 who was yielding to traffic
37	10/02/17	Monday	7:39 PM	Single vehicle crash	Dark - lighted roadway	Clear	Dry	Operating defective equipment	Unknown	Non-fatal injury	36				MV1 left the road and hit a utility pole after their steering wheel locked
38	11/17/17	Friday	7:39 PM	Rear-end	Daylight	Clear	Dry	Inattention	Unknown	No Injury	83	46			MV2 rear-ended MV1 who was stopped in traffic. OP2 stated being distracted by a tractor.

\*Courtesy Crash - A term used to describe a crash that occurs subsequent to a non-involved mainline driver who gives the right of way, contrary to the rules of the road, to another driver.

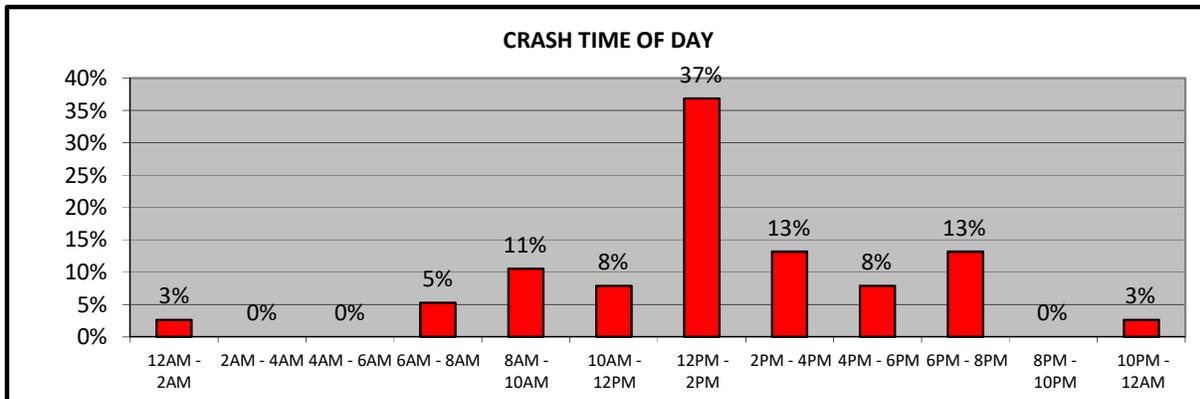
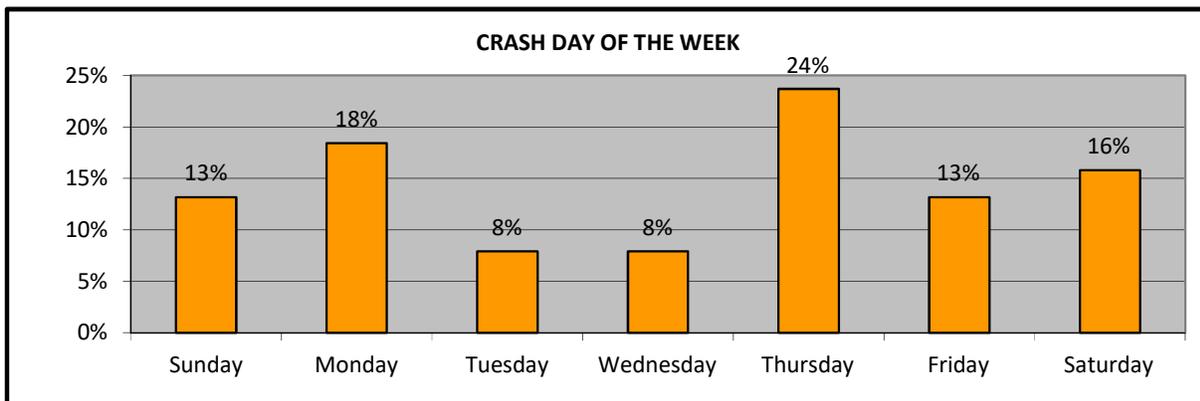
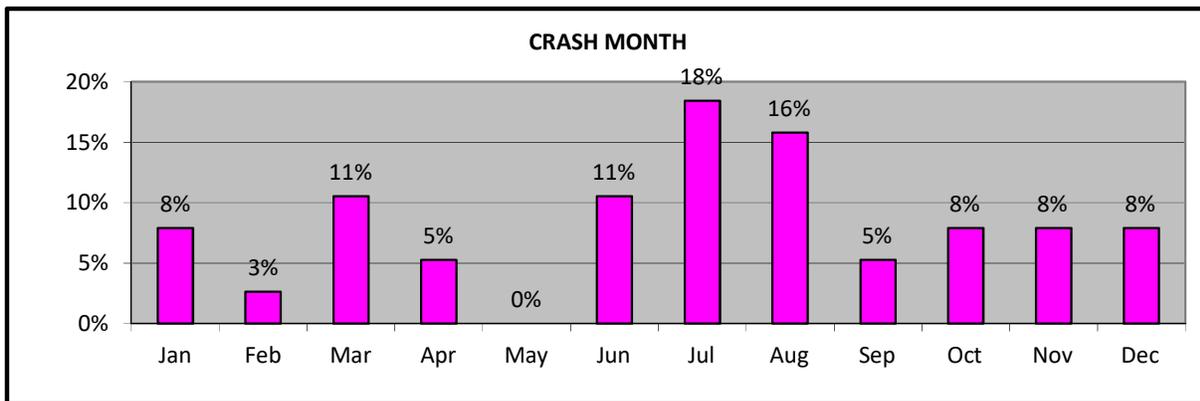
Summaries based on crash reports obtained from the Town of Dennis Police Department/MassDOT records.

## Crash Data Summary Charts

### Route 134 at Bob Crowell Road, Dennis, MA

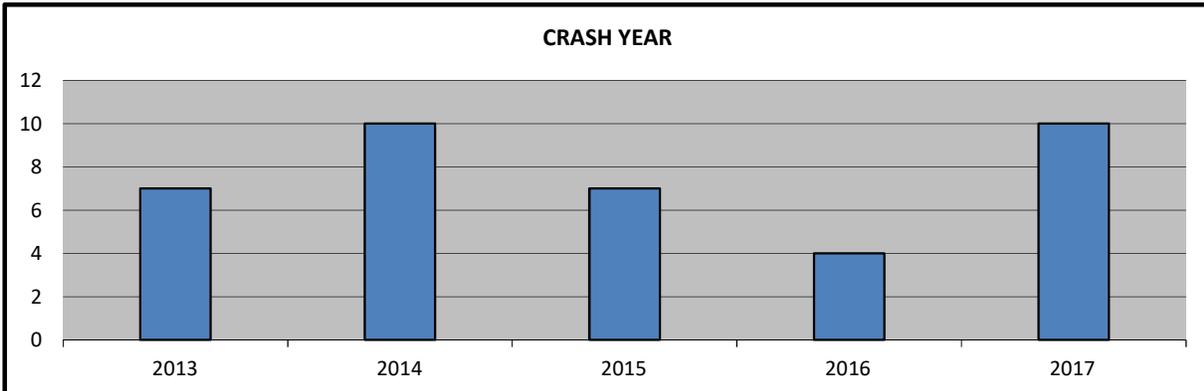
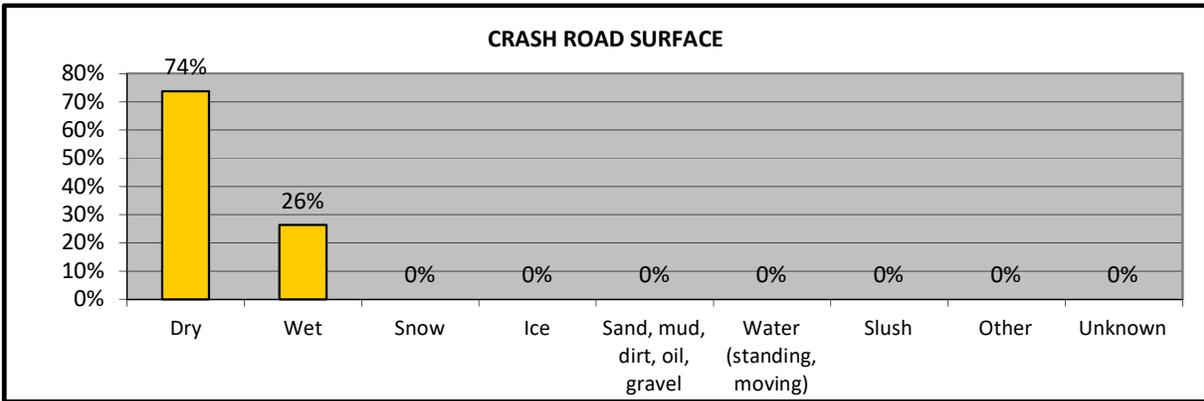
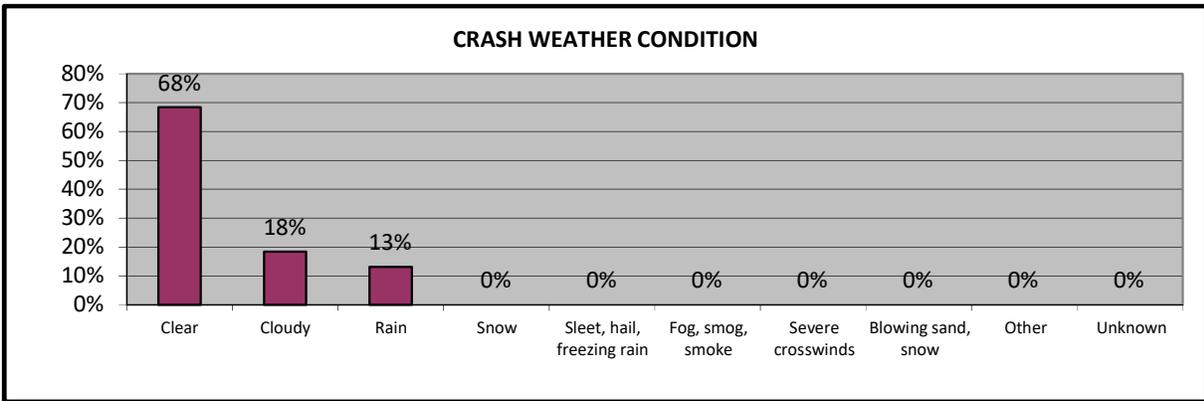
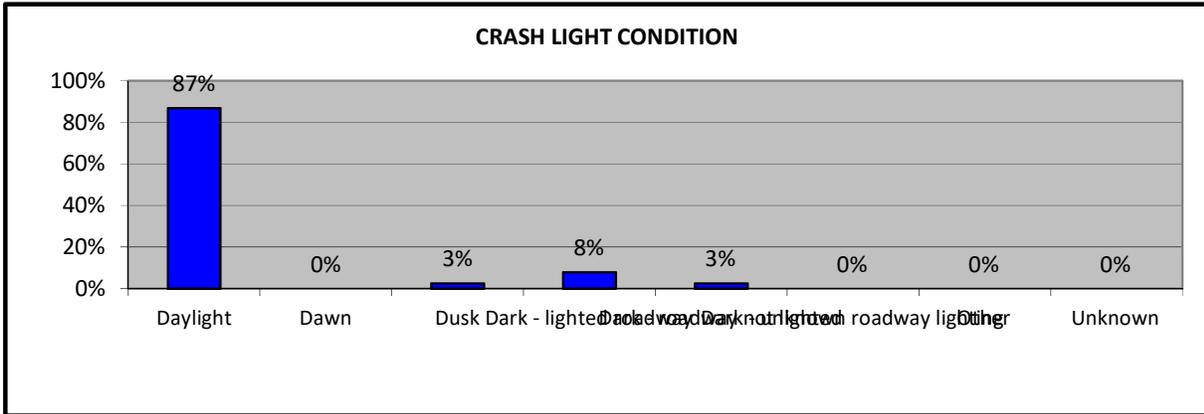


### Crash Data Summary Charts Route 134 at Bob Crowell Road, Dennis, MA



## Crash Data Summary Charts

### Route 134 at Bob Crowell Road, Dennis, MA



## Appendix D. Road Safety Audit References

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## Road Safety Audit References

*FHWA Office of Safety - Proven Safety Countermeasures*, U.S. Department of Transportation, Federal Highway Administration <https://safety.fhwa.dot.gov/provencountermeasures/>.

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